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MILITARY MEDICINE

ORIGINAL ARTICLES

Authors alone are responsible for opinions expressed in their contributions

Insectborne Virus Diseases of Military Importance*

By

ALBERT B. SABIN, M.D.†

There are more than 15 insectborne virus diseases which require consideration in different parts of the world, but only 3 of them, yellow fever, dengue and sandfly fever, and in recent years only dengue and sandfly fever, have thus far affected sufficiently large numbers of troops to be regarded as important from the numerical point of view. Others like Japanese B or Russian Spring-Summer encephalitis, which produce clinically manifest disease in only small numbers, may become significant because of the high case fatality rate or as problems in diagnosis and management. Thus, since 1951 there have been 17 deaths from Japanese B encephalitis among American military personnel and their dependents in Okinawa, Japan and Korea. In recent years there have been outbreaks of a disease, called Central European encephalitis, from which viruses have been recovered that are either closely related or identical with the tick-borne virus responsible for the Russian Spring-Summer encephalitis of the Siberian forests. The great influx of immigrants to Israel has brought to light the fact that epidemics of dengue-like fever in the Middle East can be caused by the mosquito-borne West Nile fever virus, and experimental tests of this virus as a possible therapeutic agent in cancer patients revealed that it can also cause encephalitis.

Yellow fever is no longer a threat to military operations in endemic areas because a successful vaccine provides a means of adequate control, but constant vigilance and appropriate mosquito control measures are required to keep it confined to its jungle reservoirs. Dengue fever remains an important potential problem particularly in the Western Pacific Islands, Formosa, South China, Indochina, India, Malaya, Indonesia, and Northern Australia, but the recent development of experimental vaccines capable of immunizing human beings against both known immunologic types of the virus offers new possibilities of control where mosquito-abatement may be difficult or impractical. New serologic tests based on the demonstration of antibodies for the hemagglutinins associated with the dengue viruses provide a means for both rapid diagnosis and epidemiologic survey. Sandfly fever which presents a problem in those areas of Europe, Africa and Asia lying between 20 and 45 degrees north latitude where *Phlebotomus papatasi* is prevalent, has become much more manageable in recent years not only because of the remarkable effect of DDT on the vector, but because the successful adaptation of the two known immunologically distinct viruses to newborn mice is providing new tools for diagnosis, epidemiologic survey and human vaccination.

THE PURPOSE of this communication is: (1) to call attention to the insectborne virus diseases in different parts of the world, and (2) to discuss some of the new developments in diagnosis, epidemiology, and prevention of some of these diseases. While there are more than 15 insectborne viruses which are pathogenic for man, different ones need to be considered in different parts of the world (Table 1). Thus, in the United States and Canada we are con-

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† Professor of Research Pediatrics, Department of Pediatrics, The Children's Hospital Research Foundation, Elland Avenue and Bethesda, Cincinnati 29, Ohio.

TABLE 1

INSECTBORNE VIRUS DISEASES IN DIFFERENT PARTS OF THE WORLD

Region	Viruses
U.S.A. and Canada	St. Louis, Western equine and Eastern equine encephalitis; Colorado tick fever (limited area). (Encephalomyocarditis—Mengo)?
Western Hemisphere—South of U.S.A.	Yellow fever, Dengue, Ilheus (Brazil) Venezuelan, Eastern and Western equine encephalitis
Europe—central and eastern	Central European encephalitis (Russian encephalitis—"Louping-Ill" tickborne family of viruses)
Mediterranean, Adriatic, Near East, Middle East	Sandfly fever, West Nile fever
Africa—South of 20° N Latitude	Yellow fever, West Nile fever, Rift Valley fever (Ntaya, Zika, Uganda S, Bwamba, Bunyamwera, Semliki forest, Encephalomyocarditis—Mengo)
Far East and Southwest Pacific	Dengue, Japanese B encephalitis (Murray Valley encephalitis)
Russian Far Eastern Provinces—Siberia, Vladivostok and area bordering Sea of Japan	Russian spring-summer, tickborne encephalitis Japanese B encephalitis

cerned with four such virus diseases. Three of them, i.e., St. Louis, western equine and eastern equine encephalitis, are mosquito-borne and the fourth, Colorado tick fever, is, as the name implies, a tick-borne infection which thus far has been limited to the Rocky Mountain region of the United States. In the western hemisphere, south of the United States, one needs to consider yellow fever, dengue, and the as yet little-known Ilheus virus which has been discovered in the Bahia area of Brazil. The Venezuelan, eastern and western equine encephalitis viruses are also known to be present in certain parts of South America. In Europe we have, up until recently, been inclined to think that there were no insectborne virus diseases of man in the central and eastern regions, but in recent years an entity which has come to be called Central European encephalitis has been recognized in Czechoslovakia and Austria and probably also occurs in other contiguous areas. Clinically the disease is similar to the Far Eastern Russian tick-borne encephalitis and the viruses which have been recovered from patients by several investigators appear to be closely related, if not identical, with the Russian spring-summer encephalitis—Louping-Ill family of viruses. In the Mediterranean and Adriatic areas of Europe, sandfly (pappataci or phlebotomus) fever has long been known to be endemic and at various times has been a threat to military operations in these regions. In the Middle East and the Near East, sandfly fever has long been recognized as a problem in military medicine, and recent observations on the West Nile fever virus indicate that it will also have to receive special consideration. Further south in Africa three well-known viruses require consideration in their own particular endemic regions. These are yellow fever, West Nile fever and Rift Valley fever, although there is some question as to whether the last named is ordinarily transmitted to human beings by insects. In addition to these better known viruses there is another group of seven viruses which has been recovered in the Uganda area of Africa. These are Ntaya, Zika, Uganda S, Bwamba, Bunyamwera, Mengo and Semliki forest. We know that these viruses infect human

beings but we do not know the extent to which these infections are inapparent nor do we know the type of disease, if any, they might produce under natural conditions.

In the Far East and Southwest Pacific there are only two viruses which need to be considered, although recent serologic surveys in India have raised the question of the possible occurrence of some of the African viruses in Asia. The two viruses which have been proved to cause disease in this part of the world are Japanese B encephalitis and dengue. The recent recovery of the so-called Murray Valley encephalitis virus in Australia brings to light an agent that may only represent a slightly different antigenic type of the Japanese B encephalitis virus. In the far eastern provinces of the U.S.S.R., the Russian spring-summer tick-borne encephalitis is the only insectborne virus currently known to affect human beings, except in Vladivostok and the adjacent areas bordering on the Sea of Japan, where Japanese B encephalitis is prevalent.

Although this list appears to be large, past experience has shown that only a few of these insectborne virus diseases may be important from a military point of view. There are perhaps two main categories of diseases which may be regarded as being of military importance. In the first and more significant category, one must consider the diseases which affect sufficiently large numbers of people to become a threat to military operations in endemic regions. In the second and less significant category, belong those infections which produce clinically manifest disease in only small numbers of individuals but become important because they are associated with a high case fatality rate or because they may present special problems in diagnosis or management. On the basis of past experience only three insectborne virus diseases, yellow fever, dengue and sandfly fever, can be regarded as belonging to the first category. In more recent years yellow fever has been removed from this category by the development of an effective vaccine and during World War II only dengue and sandfly fever affected sufficiently large numbers of troops to be important from a numerical point of view. One of the main reasons that these three insectborne virus diseases belong to this particular category is that almost all infections with these viruses are clinically apparent in those human beings who move into the endemic regions from parts of the world where these viruses do not occur. The other insectborne virus infections belong to the second category. Except for Rift Valley fever, the vast majority of human infections with the viruses in this category are clinically inapparent. It is possible, however, that under certain conditions some of the recently discovered viruses about which relatively little is known might achieve special importance for foreign troops operating in endemic areas.

Let me first consider the present status of the three viruses which belong to the first category of military importance. While yellow fever is no longer a threat to military operations in endemic areas because the availability of a good vaccine provides a means of adequate control, constant vigilance and appropriate mosquito control measures are required to keep this disease confined to its jungle reservoirs in Africa and the Western Hemisphere. The recent appearance of yellow fever in the Caribbean area serves to emphasize the need for continued control of *Aedes aegypti* in all cities which serve as ports of call for airplanes and ships from endemic regions.

Dengue fever remains an important potential problem particularly in the Southwestern Pacific islands, Formosa, South China, Indochina, India, Malaya, Indonesia, and Northern Australia. These are known endemic regions of this infection by virtue of past experience, actual recovery of dengue viruses or demonstration of a high incidence of antibody among the natives. The potential spread of dengue from these endemic foci to nonendemic areas was demonstrated in a most remarkable way in Japan during World War II when it is estimated that as many as two million cases of the dis-

ease occurred in the port cities of Nagasaki, Kure, Sasebo, Kobe and Osaka. According to estimates given me by the Japanese public health officers of the city, Osaka with a population of two million had 400,000 to 600,000 cases of dengue during the summer of 1944. In addition to the endemic areas just listed there are undoubtedly others about which information is currently unavailable. Simple, new serologic methods have recently been developed for the detection of antibodies against the dengue viruses. By means of these tests it is relatively easy quickly to determine whether or not the known dengue viruses are endemic in a given area. Among the ten strains of dengue virus which were recovered during World War II from New Guinea and India, representing endemic areas, and from Hawaii and Japan, representing areas with imported epidemics, only two distinct immunologic types were found to be present. It has now been shown that each of these viruses is associated with a specific hemagglutinin for chick erythrocytes and that during the course of infection human beings develop antibodies which inhibit the activity of this hemagglutinin. These hemagglutination-inhibition antibodies provide a very rapid and simple tool not only for the specific diagnosis of infection but also for epidemiologic survey. Thus, tests on 20 adult human sera from Malaya and 10 such sera from Borneo quickly established that dengue had occurred in these areas. Only 0.1 cc. of serum is required for such a test and the answer can be obtained in a few hours. By means of the hemagglutination-inhibition test it is now possible to confirm the diagnosis of dengue within 24 hours after the temperature has returned to normal. Only by further work on febrile dengue-like illnesses in suspected endemic areas will it be possible to establish whether or not additional immunologic types of dengue virus are in existence.

During World War II one immunologic type of dengue virus which was adapted to mice yielded a mutant which lost its capacity to produce the febrile systemic illness in human beings but retained its capacity to immunize against the unmodified virus. In recent years the second immunologic type of dengue virus was shown to yield a similar mutant capable of producing immunity in human beings. A vaccine utilizing these two mutant viruses offers new possibilities of control where mosquito abatement may be difficult or impractical. Experiments which are now in progress should indicate whether it will be possible to immunize against both immunologic types of the virus by injection of a mixture of the two or whether it will be necessary to inoculate the two viruses sequentially. The currently available experimental vaccine was produced in a lyophilized state from extracts of the brains of newborn mice. Since this is a living virus vaccine comparable to that of yellow fever, very small doses are effective in producing immunity. Thus, the material extracted from the brain of a single newborn mouse can provide vaccine for 100 to 1000 men with enough to spare for an adequate margin of safety. Recent studies by Dr. Sweet and myself have shown that both immunologic types of dengue virus can multiply in monkey kidney tissue cultures without producing any cytopathogenic effect. Experiments which are now in progress should show whether or not such relatively pure tissue culture fluids might provide an alternative source of virus for vaccine production.

Past military experience has shown that sandfly fever can be an important military problem in countries bordering on the Mediterranean and Adriatic seas in Europe, as well as in the Middle East and Near East, and in India where the vector *Phlebotomus papatasi* is present. There is reason to believe, however, that this infection is probably endemic in many other regions between 20° and 45° north latitude, from the Mediterranean all the way across Asia to the China Sea wherever *Phlebotomus papatasi* may be present. At the end of World War II we had three strains of sandfly fever virus. The one recovered from the Middle East near the Red Sea and the one recovered from

Sicily were immunologically identical and produced complete cross-immunity in human beings. Another strain of virus which was recovered from an American soldier in Naples and which we have since called the Naples virus possessed the properties of the other sandfly fever strains but was immunologically completely different. At the end of World War II experiments with these viruses could be carried out only in human beings; no experimental laboratory animal was available. In the last two years Dr. Sweet and I have succeeded in adapting both the Sicilian and Naples viruses to newborn mice. This has provided us with new tools for working with these viruses in the laboratory and also for specific diagnosis and serologic survey. Drs. R. Taylor and J. Casals, working with viruses recovered from the blood of Egyptian children, have now found at least two agents which are immunologically identical with our Sicilian strain of virus. The mouse-adapted Sicilian strain has yielded a mutant which has lost its capacity to produce the febrile systemic illness in human beings but has retained its capacity to produce immunity against the unmodified human virus. Tests are currently in progress in human beings with the Naples mouse-adapted virus.* Such mutant strains would, of course, also be useful for artificial immunization under special circumstances. The special habits of the vector, *Phlebotomus papatasi,* and its remarkable susceptibility to DDT provide a means for controlling the infection in houses and tents but, without complete elimination of the vector from an area, there would still remain considerable risk of infection to those who would have to remain in the open during the hours between sundown and sunrise.

In the second category of military importance I referred to those insectborne virus infections which produce clinically manifest disease in only small numbers but which are associated with a high case fatality rate. Among these one must mention especially the viruses of Japanese B encephalitis and the related Murray Valley encephalitis, and the Russian spring-summer encephalitis and its related Central European encephalitis, as well as the encephalitis viruses of the Western Hemisphere. Because of our ignorance of its natural history and behavior, Japanese B encephalitis loomed as a potentially important military problem in 1945 when we had approximately 225,000 men on Okinawa at a time when a few cases of the disease were first recognized on the island. Actually, although a larger number was suspected of having the disease, only 11 cases of encephalitis were finally proved to have been caused by this virus. The subsequent experience on Okinawa, Japan, Korea, and in other parts of the Far East showed that a varying and unpredictable number of cases of this disease could be expected every year. Since 1951 there have been 17 deaths from Japanese B encephalitis among American military personnel and their dependents in Japan, Okinawa and Korea. How many of these might have been prevented if the best available vaccine had been used is difficult to tell. In 1945 a formalinized mouse brain vaccine was prepared which, when administered in proper doses, could produce antibody in at least 50 per cent of individuals. During 1945 and 1946, this vaccine was administered to approximately 300,000 troops but, for various practical considerations, a vaccine of lesser potency prepared from chick embryos was then substituted. After the experience in Korea in 1950 when a considerable number of cases of Japanese B encephalitis occurred among troops who were vaccinated in various ways, some adequately and some inadequately, the whole program of vaccination against this disease was discontinued. The decision of using a vaccine of borderline efficiency against a disease of very low incidence is not an easy one. It may perhaps be worth noting that during the past year I have found that the Japanese B encephalitis virus multiplies to high levels in monkey

* These tests have shown that the mouse-adapted Naples virus also lost its capacity to produce illness in human beings and can immunize against the unmodified human virus.

kidney tissue cultures without producing any cytopathogenic effect. It may be desirable to pursue this further to determine whether or not a vaccine prepared from this more desirable source of virus might prove to be more effective. The recent studies on the virus recovered from Murray Valley encephalitis in Australia indicate that it is very closely related to the virus of Japanese B encephalitis. My own interpretation of various reported and unreported studies would be that it represents a related but distinct immunologic type of the Japanese B virus. If this interpretation is correct, it becomes necessary to determine whether or not similar quantitative antigenic differences may exist among different strains of Japanese B encephalitis virus which occur in Japan, Korea, Okinawa and other parts of the Far East outside of Australia. Unless one can show that different strains are immunologically identical the use of a vaccine of borderline effectiveness prepared with a single strain could hardly be expected to provide complete protection.

The extensive and as yet unpublished work of recent years of the virus, epidemiology and entomology divisions of the 406th General Medical Laboratory in Japan has added a great deal to our knowledge of the role of various mosquitoes and birds in the epidemiology of Japanese B encephalitis in Japan. Thus it is quite clear now that *Culex tritaeniorhynchus* is the only mosquito vector in nature and that black-crowned night herons and egrets attract this mosquito and are infected by the virus. It still is not clear why no virus can be found in *Culex pipiens* which are also attracted in large numbers to these birds, nor has it been established whether the mosquitoes merely transmit the infection to the birds or also acquire it from them. These particular birds occur only in limited areas of Japan while infection of human beings and domestic animals is extensive throughout Japan, south of Hokkaido. Where the *Culex tritaeniorhynchus* mosquitoes get their virus to start an epidemic is still as much of a mystery as ever. It does appear, however, that large numbers of these mosquitoes become infected within a few weeks prior to the appearance of an epidemic and by the time an epidemic is recognized, the vast majority of human beings have already been infected and most of the *C. tritaeniorhynchus* mosquitoes are either dead or uninfected. It is for these reasons that one can expect very little from heroic mosquito control measures *after* an epidemic has been recognized.

The basic problem of the ultimate reservoir of the St. Louis, Western equine and Eastern equine encephalitis viruses also requires elucidation and solution. Dr. Hammon informs me that recent work in his laboratory by Doctor Preston Holden indicates that the Eastern virus has a cycle in pheasants without any arthropod vector. The high incidence of febrile illnesses without encephalitis among laboratory personnel engaged in work on Venezuelan equine encephalitis, makes it highly desirable to determine whether this virus may be the cause of such unrecognized febrile diseases of man in areas where this virus is endemic, but no work on this subject has as yet been reported. The greatest progress in recent years has been made in the elucidation of the epidemiology of West Nile fever. The great influx of immigrants to Israel together with a group of alert investigators brought forth unequivocal evidence that epidemics of a disease, which is clinically indistinguishable from dengue, can be caused by the mosquito-borne West Nile virus. This virus, which was first recovered in 1940 by Smithburn and his associates from the blood of a mildly ill native woman in Uganda, and subsequently from the blood of Egyptian children by Doctors Paul and Melnick is now known to be a common cause of infection among human beings in the Nile Valley from the Southern Sudan to the Nile Delta. The experimental use of mouse-adapted strains of this virus as a possible therapeutic agent in cancer patients by Doctors Southam and Moore revealed that it can also cause encephalitis. Work at the Naval Medical Research Unit No. 3, Cairo,

Egypt, aided by the Rockefeller Foundation, has contributed significantly to the epidemiology and the natural history of this infection (West Nile). According to a personal communication from Dr. Taylor, the picture is probably somewhat as follows: Transmission occurs mainly during the summer months by *Culex* mosquitoes and particularly *Culex univittatus*. The main vertebrate reservoir appears to be in birds as the virus has been isolated from both crows and pigeons, and experimentally these birds as well as others can be infected by mosquitoes and in turn transmit the infection to mosquitoes permitted to feed upon them. The infection of man as well as other mammalian hosts is likely secondary to the bird-mosquito cycle. The manner of over-wintering of the virus has not been definitely determined, but a virus having similar characteristics, though perhaps not identical to West Nile, has been isolated repeatedly from *Argas* ticks.

While the epidemiology of Russian spring-summer encephalitis in the Far East has been clearly shown by Russian investigators to be dependent on the wood tick, *Ixodes persulcatus*, it is not yet clear whether the recently recognized Central European encephalitis is similarly transmitted. The viruses recovered from the European disease appear to be such close antigenic variants of those found in the Far East and those associated with the tick-borne louping-ill of Northern England and Scotland, that the mode of transmission is also likely to be similar. The case fatality rate is very high and the Russians have used a formalinized mouse brain vaccine for military and other personnel operating in endemic areas, and a similar vaccine has been used to protect laboratory personnel working with this virus at the Army Medical School in Washington.

Among the other recent advances in the field of insectborne virus diseases may perhaps be mentioned the development of simple and rapid diagnostic tests which are based on hemagglutination-inhibition. Because the hemagglutination-inhibition antibodies develop earlier than the complement-fixing antibodies, it is now possible to provide the clinician with a specific diagnosis by the time the temperature has returned to normal rather than weeks after the patient has died or been discharged from the hospital. Extensive tests by Major Buescher and Captain Chanock at the 406th General Medical Laboratory in Tokyo have shown that this rapid, *in vitro*, technic is the diagnostic test of choice for Japanese B encephalitis. Adequately investigated hemagglutinins are also available for the St. Louis, West Nile, dengue and yellow fever viruses as well as for the Western and Eastern equine encephalitis viruses and some of the lesser known South American and African viruses.

The medical officer responsible for military preventive medicine wants to have answers to the following questions about the insectborne virus diseases of man:

1) Which ones are endemic in certain regions?

2) Are they diseases of high incidence or low incidence?

3) What are the simplest and most rapid specific diagnostic tests?

4) What can be done to prevent them?

It is hoped that this discussion of recent advances as well as of the limitations of our present knowledge, has contributed at least a partial answer to these questions.

Dedication ceremonies of the new building of the Armed Forces Institute of Pathology, Walter Reed Army Medical Center, will be held May 26 and 27, 1955.

Respiratory Diseases Caused by Viruses*

By
JOHN H. DINGLE, M.D.†

RESPIRATORY diseases have long been recognized as constituting a major problem for all branches of the armed services. Among such diseases, those caused by viruses have always comprised a large segment of the problem, but their importance has become, by contrast, increasingly great since the discovery of effective therapy for bacterial infections of the respiratory tract. Despite the many difficulties that have surrounded the study of these viral diseases, considerable progress has been made since the beginning of World War II. I shall attempt to summarize briefly certain aspects of the respiratory viral diseases that appear to be of particular military significance and to discuss the present status of therapy and prevention.

Military Importance of Respiratory Diseases Caused by Viruses

At the beginning of World War II, medical officers were justifiably concerned with the problem of influenza, which historically, at least, had been the outstanding epidemic respiratory disease of viral etiology. As the medical history of the war unfolded, however, it became evident that the 1918-1920 pandemic of influenza was not to be repeated. Epidemics of influenza did occur in the winters of 1940-41, 1943-44, and 1945-46, but they did not compare in severity with the former pandemics. In retrospect, it is apparent that other viral infections of the respiratory tract were principally responsible for hospital admission rates and non-effective rates due to respiratory diseases. The overall figures for the occurrence of different types of respiratory disease were roughly as follows: "Common Respiratory Disease" or "Catarrhal Fever" accounted for approximately 80 to 90 per cent of respiratory admissions. These diagnostic terms encompassed a variety of clinical forms of respiratory disease that could not be more specifically classified, and included such designations as severe common cold, grippe, bronchitis, etc. About 5 to 10 per cent of respiratory admissions were classified as "primary atypical pneumonia," and from 1 to 2 per cent were bacterial pneumonias. The remainder, which varied in its percentage from area to area, included influenza, streptococcal infections, non-bacterial tonsillitis and pharyngitis, and the viral exanthemata.

At the present time, therefore, it seems necessary to include the "Common Respiratory Disease" group and primary atypical pneumonia with influenza as viral respiratory diseases of major military importance (table 1). Other viral diseases of the respiratory tract, or presumably transmitted via the respiratory passages, appear to be of minor importance.

Influenza

Prior to World War II, the work of Andrewes, Francis, Magill and others[1-5] had

Table 1
Military Importance of Respiratory Diseases Caused by Viruses

Importance	Disease
Major	Influenza Common Respiratory Diseases Acute Respiratory Disease (ARD) Primary Atypical Pneumonia
Minor	Non-bacterial Tonsillitis and Pharyngitis Common Cold Psittacosis and Ornithosis Viral Exanthemata

* Presented at the 61st Annual Convention of the Association of Military Surgeons of the United States, Hotel Statler, Washington D.C., November 29-December 1, 1954.

† Professor of Preventive Medicine, School of Medicine, Western Reserve University, Cleveland, Ohio and Director of the Commission on Acute Respiratory Diseases, Armed Forces Epidemiological Board.

established two immunological types of viruses as the cause of influenza. Moreover, laboratory procedures were available for confirmation of the specific diagnosis of the two types, termed influenza A and B. It was thus possible for several groups of investigators to carry out thorough and detailed clinical and epidemiological studies on influenza as it occurred in military populations both during and after the War.[6] It was likewise possible for extensive studies to be performed on the development and trial of vaccination under the auspices of the Commission on Influenza.[7]

Several aspects of these studies are of considerable military importance. Although it is now clear that influenza occurs sporadically or endemically as well as epidemically, its epidemic occurrence is of primary concern.[8–10] Initial recognition of influenzal epidemics must still be based on a combined clinical and epidemiological diagnosis. When respiratory disease rates increase, usually abruptly, and the majority of cases present the classical clinical picture of influenza, the beginning of an epidemic must be suspected. Confirmation can, of course, be obtained later by isolation of the virus or by serological studies. In a military population composed of recruits as well as seasoned men, an additional clue as to the occurrence of epidemic influenza can often be noted. As will be mentioned later, recruits are subject to outbreaks of acute respiratory disease, particularly in winter months, that clinically and epidemiologically may be indistinguishable from influenza. Such outbreaks do not occur in seasoned men on the same post or within the same population group. In contrast, epidemic influenza will affect both recruits and seasoned men.

Since the pandemic of 1918, outbreaks of influenza have tended to occur cyclically: influenza A or A′ at intervals of 1 to 3 years; influenza B at intervals of 4 to 6 years.[11–12] The periodicity is not sufficiently consistent to permit reliable predictions of epidemic occurrence in any geographic area in a particular year, but knowledge of this behavior is of value when considered in the light of the world-wide occurrence of influenza. It is now apparent, for example, that minor focal outbreaks of influenza may precede by some months the development of a major spreading epidemic. Such was the case in the spring of 1943 before the November, 1943, epidemic of influenza A, and in the spring and summer of 1945 in the United States and in the Pacific before the epidemic of influenza B in December. Numerous other examples have been obtained as the result of the establishment of "detection centers" by our military forces throughout the world and from laboratories collaborating with the Commission on Influenza of the Armed Forces Epidemiological Board and the Influenza Center of the World Health Organization. It is important that this type of activity be continued in the future, since additional knowledge of the world behavior of influenza may well lead to truly reliable predictions.

The studies of the Commission on Influenza in 1943 and 1945 indicated that partially purified influenza virus vaccines could reduce the clinical attack rate of influenza by as much as 75 to more than 90 per cent. In the 1947 epidemic, however, the vaccine was not effective. The reason was soon apparent from studies of the viral strains producing this epidemic. Although falling into the influenza virus A group, these strains, now termed A′, differed antigenically from the previous A strains to such a degree that there was little immunological overlap. The older strains incorporated in the vaccine thus could not engender resistance to the new epidemic types. This change in the virus, apparently due to genetic mutation, immediately raised doubts regarding the value of influenza viral vaccines, since the frequency or extent of further antigenic alteration could not be predicted. Subsequent work, however, demonstrated that the A′ strains used as vaccines could stimulate resistance to the A′ disease, and further, that the pattern of strain prevalence has extended over a period of years. Moreover, it is entirely possible that the extent of potential antigenic variation is limited in any one type of virus.[13, 14] For these reasons,

therefore, studies on immunization against influenza should be continued and vaccination of key population units at the present time is justifiable.

Mention should be made of a third type of influenza virus, now known as influenza virus C. Although apparently widely distributed judging from the prevalence of antibodies to it, this type does not appear now to be responsible for widespread outbreaks of clinical disease.[12] At the moment it is not of military importance.

Common Respiratory Diseases

As already mentioned, the diagnostic category of "common respiratory disease" or "catarrhal fever" includes a miscellany of clinical syndromes varying from the common cold to bronchitis.[15] Probably the most important entities in this group from the military point of view, however, are the diseases that occur endemically and epidemically in recruits. The susceptibility of recruits to respiratory infections has long been known and it seems probable that a major characteristic of the process known as "seasoning" is the development of resistance to certain forms of respiratory disease.

During World War II, the Commission on Acute Respiratory Diseases described in some detail the clinical and epidemiological characteristics of respiratory disease in recruits.[16–19] The most important problem was clearly that of a grippe-like respiratory infection which occurred epidemically in the winter months in recruits, but not in seasoned men. In many training batteries or companies one-third of the unit would require hospitalization within a period of about 3 weeks. Second outbreaks were not observed in units which had experienced this infection or in men from such units transferred to others. Epidemiologically at least, immunity seemed to follow this infection.

Among hospitalized patients, the infection was an acute, febrile illness characterized by constitutional symptoms of feverishness, chilliness, malaise and anorexia, and, less prominently, respiratory symptoms of irritated or sore throat, hoarseness and cough. Physical examination revealed acutely ill, febrile patients who demonstrated moderate pharyngeal infection, pharyngeal lymphoid hyperplasia, minimal cervical adenopathy and little else of significance. Patients showing pulmonary infiltration radiographically were termed "primary atypical pneumonia" by definition and excluded from this group. Laboratory examinations were within normal limits. The duration of acute illness was from from 3 to 7 days, but convalescence often required 1 to 2 weeks.

Thus the disease appeared to be an entity clinically and epidemiologically; it resembled influenza but was not caused by the influenza viruses. For purposes of terminology, the disease was called "Acute Respiratory Disease (ARD)." An etiological agent could not be isolated by the techniques then available. Studies in volunteers, however, demonstrated that the infection was transmissible by filtered secretions of the respiratory tract.[20, 21] The illnesses induced were milder than, but clinically compatible with, the naturally occurring disease. The incubation period averaged 4 to 5 days. After recovery, the volunteers were immune to reinoculation. Moreover, it was clearly evident from the results of cross-inoculations that ARD was distinct from the common cold and from primary atypical pneumonia characterized by cold hemagglutinins.

Recently Hilleman and Werner[22] have isolated, by tissue culture techniques, a new virus termed RI-67, from cases resembling ARD which occurred epidemically among recruits at Fort Leonard Wood, Missouri. Antibody studies demonstrated that this virus was immunologically related to the ARD cases and to some cases occurring simultaneously which had pulmonary infiltration but did not develop cold hemagglutinins or agglutinins to streptococcus MG. Subsequently it has been shown in Dr. Hilleman's laboratory, and also in ours, that this virus has apparently been the cause of many cases and outbreaks of ARD in military populations from 1942 until the present time.[23] Moreover, examination of serum specimens saved from the volunteer studies

referred to above, demonstrated that this virus was apparently the cause of the experimentally induced ARD illnesses but was not related to the common cold or to primary atypical pneumonia associated with cold hemagglutinins.

At the present time it appears that the RI-67 virus of Hilleman is the cause, or is very closely related to the cause, of much but not all of the recruit disease, ARD. Both endemic and epidemic cases of this respiratory disease have occurred in which this particular virus has seemed to play no role. It is probable that other viruses, similar in their general properties but antigenically distinct, also produce the ARD type of disease. Among them may be certain of the types of viruses that Rowe and his associates[24] have isolated from adenoidal tissue.[25]

Primary Atypical Pneumonia

The discovery and use of the sulfonamide drugs in the treatment of pneumonia was to a considerable extent responsible for the recognition and appreciation of the importance of primary atypical pneumonia during the early part of the last war.[26, 27] Although outbreaks of a clinically similar disease had been described prior to this time, the failure of chemotherapy in such cases, in contrast to its efficacy in pneumococcal pneumonia, lent emphasis to the problem, particularly in the military forces.

Primary atypical pneumonia is an acute respiratory disease characterized by gradual or insidious onset, by constitutional symptoms as well as symptoms referable to the respiratory tract, by cough, sputum, pulmonary infiltration best demonstrable radiographically, and by relatively prolonged convalescence. The results of clinical laboratory examinations are usually within normal limits and pathogenic bacteria are not ordinarily found in cultures of the sputum or respiratory passages.[28] This clinical picture thus constitutes a syndrome which may be produced by a number of known agents, such as *Coccidioides immitis*, psittacosis viruses, influenza viruses, etc. Such known agents, however, have been responsible for a very small number of cases in military forces; the great majority of cases have been of unknown etiology. The diagnosis is therefore based on exclusion. Two laboratory tests, cold hemagglutination and streptococcus MG agglutination, have been of value in helping to confirm the diagnosis in only a portion of cases, but may possibly be indicative of multiple etiologic agents as yet undiscovered.

In the Army, primary atypical pneumonia has constituted 70 or more per cent of all the cases of pneumonia. Yet for the most part the disease has occurred sporadically or endemically, attack rates rarely exceeding 1 to 2 per 1000 men per week, even at times of peak incidence. Epidemics have occurred, however, in both civilian and military populations with attack rates as high as 14 to 35 per cent. In general, though, the incidence follows that of total respiratory disease, the rates being higher in the winter than in the summer. This relationship has led to the hypothesis[16, 28–30] that the same agent or agents may be responsible for both primary atypical pneumonia and some of the milder types of acute respiratory illness.

Many attempts have been made by several groups of investigators to isolate etiological agents from patients with primary atypical pneumonia. Laboratory animals, chick embryos, and, more recently, tissue cultures have been employed. Thus far none has been unqualifiedly successful and the etiology of the disease has not been fully classified. The volunteer studies of the Commission on Acute Respiratory Diseases have demonstrated that the disease may be transmitted in man by inoculation with bacteria-free secretions of the respiratory tract of patients having the cold-hemagglutinin type of infection.[31] Presumably, therefore, the cause of this type is a virus. As pointed out above, however, the clinical picture is in actuality a syndrome which may be produced by well recognized agents, such as the influenza and psittacosis viruses. These instances can thus be excluded from the large group of primary atypical pneumonias of unknown etiology. The recent studies on the RI-67 virus of

Hilleman and Werner[22, 23] have shown that this virus may apparently induce epidemics of Acute Respiratory Disease (ARD) and further, that some of the cases will show pulmonary infiltration radiographically, and, by definition, may thus be termed cases of primary atypical pneumonia. None of these patients has had cold hemagglutinins or agglutinins for streptococcus MG. Conversely, sera from other patients having such agglutinins have failed to show an immunological association with the RI-67 or ARD virus. It therefore seems reasonable to conclude that, as in influenza, pulmonary infiltration may occur in occasional cases of Acute Respiratory Disease. Such instances, when specifically identified, may thus be diagnosed in terms of causation and excluded from the group of primary atypical pneumonias of unknown etiology.

The recent studies are thus providing some etiologic support for previous hypotheses that more than one unidentified agent may produce the syndrome of "primary atypical pneumonia of unknown etiology" and that the same agent or agents may induce both a pneumonic and non-pneumonic form of disease

Treatment and Prevention

Up to the present time very little success has attended the search for drugs or other measures that will specifically cure viral diseases, including the viral respiratory diseases of major military importance. Psittacosis or ornithosis can be effectively treated with the broad spectrum antibiotics. The recent studies of Meiklejohn and his associates[32] indicate that the more febrile and severe cases of primary atypical pneumonia are benefited by the administration of broad spectrum antibiotics, although similar improvement is not observed in the milder, less febrile cases. Whether this result is due to a specific action of the antibiotic on the virus or is due to an antipyretic action[33] has not yet been clearly established. No chemotherapeutic agent has yet been found that is of specific efficacy in influenza and the acute respiratory diseases, so that dependence must still be placed on symptomatic and supportive measures.

The outlook for specific therapy in the future, however, is not necessarily bleak. An effective remedy may be discovered at any time, either accidentally or through the extensive screening programs that are now going on in several laboratories. Of greater potentiality perhaps, are the basic studies of the mechanism of viral multiplication and pathogenesis of viral lesions, and of measures that will interfere with or inhibit progressive steps in these processes. From such studies will come the knowledge that will provide greater direction to the search for specific therapy.

Several approaches have been made to the prevention and control of viral respiratory diseases. The broadest of these, which was studied intensively during World War II, is that of preventing the occurrence and spread of respiratory diseases by procedures designed to prevent contamination of the air and airborne infection, such as oiling of floors and blankets, ultraviolet irradiation and glycol vapors.[34] Thus far, at least, the results of this approach have not provided a solution to the problem of control of respiratory diseases in either military or general populations.

The approach of active immunization appears to have the greatest potentiality at the present time. As already indicated, influenza virus vaccines have been effective in the past and, in the opinion of many students of the disease,[12,14] will be so in the future, as further information is obtained regarding the occurrence and distribution of variants of the viruses. The use of active immunization for the control of Acute Respiratory Disease of recruits (ARD) has not yet been attempted, largely due to problems of production of virus in cultures of normal tissue cells. Theoretically at least, this procedure should be effective for several reasons. Epidemiologically the disease is followed by immunity.[16, 17] For one type of virus, Hilleman's RI-67 strain, relatively high neutralizing antibody titers are found during convalescence.[22, 23] Retrospective studies of

volunteer experiments[20, 21] indicate that susceptibility was correlated inversely, and resistance directly, with the presence of circulating neutralizing antibodies.[23] Finally, this virus appears to be a good antigen. Thus the potentiality of active immunization for the control of ARD of recruits appears to be great and warrants exploration. Other viruses apparently responsible for similar cases of recruit disease may likewise be suitable for this approach.

Passive immunization is generally considered to be of limited or no value in respiratory viral diseases, particularly for mass application. Consideration might well be given to the investigation of this procedure, however, in recruit populations during the winter months. At this time of year, recruits may arrive at replacement training centers from induction centers with elevated respiratory disease rates and may experience an epidemic within the next 2 to 3 weeks,[16, 17] before active immunization could be effective. Several lots of human gamma-globulin have been shown to contain high titers of neutralizing antibodies for Hilleman's RI-67 strain of ARD virus.[23] It is possible that selective passive immunization of recruits could prevent or reduce those outbreaks and the resultant loss of man-days of training.

Finally, mention should be made of the prevention of bacterial complications in the major viral respiratory diseases by chemoprophylaxis. Fortunately, such complications are extremely rare in the common respiratory diseases, in primary atypical pneumonia, and even in influenza—apart from certain rare and spectacular epidemics such as the pandemic of 1918-20 and the influenza A epidemic on the east coast of the United States in January, 1941. Bacterial complications, when they do occur, are readily apparent from the course of the patient's illness, and can be recognized in time to institute adequate specific therapy. Considering, in addition, the hazards of routine administration of chemotherapeutic drugs, chemoprophylaxis should be reserved for selected patients in whom it is indicated for other reasons, or for those rare epidemics which are known to have a bacterial component.

References

[1] Smith, W., Andrewes, C. H., and Laidlow, P. P. Virus obtained from influenza patients. Lancet 2: 66-88, 1933.

[2] Francis, T., Jr. Transmission of influenza by filterable virus. Science 80:457-459, 1934.

[3] Idem. New type of virus from epidemic influenza. Science 92:405-408, 1940.

[4] Magill, T. P. Virus from cases of influenza-like upper respiratory infection. Proc. Soc. Exper. Biol. & Med. 45:162-164, 1940.

[5] Horsfall, F. L., Jr., et al. Nomenclature of influenza. Lancet 2:413, 1940.

[6] Dingle, J. H. Influenza. New England J. Med. 237:845-852, 1947.

[7] Commission on Influenza. 1943 studies of vaccination against influenza; series of 7 papers. Am. J. Hyg. 42:1-105, 1945.

[8] Commission on Acute Respiratory Diseases. Endemic influenza. Am. J. Hyg. 47:290-296, 1948.

[9] Idem. Influenza B: Study of a localized outbreak preceding the 1945 epidemic. Am. J. Hyg. 47:297-303, 1948.

[10] Idem. Studies on the 1943 epidemic of influenza A; series of 8 papers. Am. J. Hyg. 48:253-349, 1948.

[11] Idem. The periodicity of influenza. Am. J. Hyg. 43:29-37, 1946.

[12] Francis, T., Jr. Influenza: The newe acquayantance. Ann. Int. Med. 39:203-221, 1953.

[13] Idem. Significance of antigenic variation of influenza viruses in relation to vaccination in man. Federation Proc. 11:808, 1952.

[14] Salk, J. E. An interpretation of the significance of influenza virus variation for the development of an effective vaccine. Bull. New York Acad. Med. 28:748, 1952.

[15] Dingle, J. H. Common virus infections of the respiratory tract. Diagnosis and etiology. J.A.M.A. 138:1084-1088, 1948.

[16] Commission on Acute Respiratory Diseases. Epidemiology of atypical pneumonia and acute respiratory disease at Fort Bragg, North Carolina. Am. J. Pub. Health 34:335-346, 1944.

[17] Idem. Acute respiratory disease among new recruits. Am. J. Pub. Health 36:439-450. 1946.

[18] Idem. Clinical patterns of undifferentiated and other acute respiratory diseases in army recruits. Medicine 26:441-464, 1947.

[19] Idem. Bacteriological findings in undifferentiated and other acute respiratory diseases. Medicine 26:465-484, 1947.

[20] Idem. Experimental transmission of minor respiratory illness to human volunteers by filter-passing agents. I. Demonstration of two types of illness characterized by long and short incubation periods and different clinical features. J. Clin. In-

vestigation 26:957-973, 1947.

[23] Idem. Experimental transmission of minor respiratory illness to human volunteers by filter-passing agents. II. Immunity on reinoculation with agents from two types of minor respiratory illness and from primary atypical pneumonia. J. Clin. Investigation 26:974-982, 1947.

[24] Hilleman, M. R., and Werner, J. H. Recovery of new agent from patients with acute respiratory illness. Proc. Soc. Exper. Biol. & Med. 85:183-188, 1954.

[25] Dingle, J. H., Ginsberg, H. S., Badger, G. F., Jordan, W. S., Jr., and Katz, S. Evidence for the specific etiology of "Acute Respiratory Disease (ARD)." Trans. Assoc. Am. Phys. 67:149-155, 1954.

[26] Rowe, W. P., Huebner, R. J., Gilmore, L. K., Parrott, R. H., and Ward, T. G. Isolation of a cytopathogenic agent from human adenoids undergoing spontaneous degeneration in tissue culture. Proc. Soc. Exper. Biol. & Med. 84:570-573, 1953.

[27] Jordan, W. S., Jr., Badger, G. F., Dingle, J. H., Ginsberg, H. S., and Katz, S. The serologic epidemiology of respiratory agents isolated in HeLa cell cultures. Proc. Central Society for Clinical Research 27:61-62, 1954.

[28] Dingle, J. H. Atypical pneumonia. In Advances in Pediatrics, vol. II, 194-237. Interscience Publishers, Inc., New York, 1947.

[29] Idem. Primary atypical pneumonia. In Banks, H. S. Modern Practice in Infectious Fevers, vol. 2, pp. 626-645, Paul B. Hoeber, Inc., New York, 1951.

[30] Dingle, J. H., Abernethy, T. J., Badger, G. F., Buddingh, G. J., Feller, A. E., Langmuir, A. D., Ruegsegger, J. M., and Wood, W. B., Jr. Primary atypical pneumonia, etiology unknown. Am. J. Hyg. 39:67-128, 197-268, and 269-336, 1944.

[31] Reimann, H. A., and Havens, W. P. An epidemic disease of the respiratory tract. Arch. Int. Med. 65:138, 1940.

[32] Favour, C. B. Infections associated with an epidemic of primary interstitial pneumonia. New England J. Med. 230:537, 1944.

[33] Commission on Acute Respiratory Diseases. The transmission of primary atypical pneumonia to human volunteers. I. Experimental methods; II. Results of inoculation; III. Clinical features; IV. Laboratory studies. Bull. Johns Hopkins Hosp. 59: 97-167, 1946.

[34] Meiklejohn, G., Thalman, W. G., Waligora, D. J., Kemper, C. H., and Lennette, E. H. Chemotherapy of primary atypical pneumonia. J.A.M.A. 154:553-557, 1954.

[35] Tillotson, I. G., and Ginsberg, H. S. An antipyretic action of aureomycin. Inhibition of febrile response to influenza virus in rabbits. Proc. Soc. Exper. Biol. & Med. 85:192-197, 1954.

[36] Langmuir, A. D. Air-borne infection. In Maxcy, K. F. Preventive Medicine and Public Health, pp. 152-167. Appleton-Century-Crofts, Inc., New York, 1951.

U. S. Army Photo

MISS MASON and DR. PAUL R. HAWLEY pin the stars on BRIG. GEN. JAMES B. MASON, MC, USAR, recently promoted to that rank. General Mason is an Executive Assistant to Dr. Hawley, Director, American College of Surgeons, and formerly Chief Surgeon in European Theater, World War II.

Rickettsial Diseases*

By
JOHN C. SNYDER, M.D.†

I AM GRATEFUL to General Chambers for his invitation to address the 61st Annual Meeting of the Association of Military Surgeons. In my opinion, it is a privilege to speak to this distinguished group because the principles of preventive medicine are so firmly supported by this Association. During the second world war, the new developments for prevention and control of rickettsial diseases were accomplishments in military medicine of the first order.

Since all of you in this audience are thoroughly familiar with the general background of the rickettsial infections of man, my paper this afternoon is directed toward an evaluation of recent trends of potential importance to military forces. The current classification of rickettsial diseases is presented in condensed form in Table 1, which shows the grouping of the principal infections and gives my views as to appropriate terminology. In this list, the real problems for military forces are, specifically, epidemic typhus, scrub typhus, and Q fever. Although my remarks are concerned largely with these three diseases, I wish to emphasize strongly that other rickettsial infections may become military problems in some future campaign. The two eminent students of rickettsiae, Zinsser and Wolbach, both stressed repeatedly that we must be alert to the appearance of rickettsial diseases whenever man, rodents and ectoparasites common to both, come into close proximity. The paragraphs which follow consider briefly the new developments in epidemiology, immunology, diagnosis, prevention and treatment.

EPIDEMIOLOGY

In 1934, Zinsser proposed his hypothesis that man is the interepidemic reservoir of epidemic louse-borne typhus. He postulated that the micro-organisms remain latent somewhere in the tissues after the subject has recovered from an attack of the disease, and that years later, for reasons not understood, the organisms become active, inducing a second attack. He indicated his belief that human body lice which might feed on such patients would become infected and thus could serve to initiate a new epidemic, if there were susceptible people in the environment.

In support of his hypothesis, Zinsser showed that three strains of typhus rickettsiae isolated from sporadic cases in Boston were similar to virulent strains recovered during epidemics. Subsequently, Dr. Edward S. Murray and I were able to show conclusively that the micro-organisms responsible for Brill's disease were fully virulent and indistinguishable from the classical epidemic strains. This was accomplished by feeding our normal colony of human body lice on patients early in the disease. The infection in lice was of adequate intensity in our opinion to permit the spread to other human subjects and thus one phase of Zinsser's hypothesis has been established. Dr. Murray then demonstrated that many cases of Brill's disease are presently occurring in areas which had been swept over by epidemics during the second world war. During a period of two months in the summer of 1950 in Yugoslavia, he found 26 cases which were proven to be caused by typhus rickettsiae; only one of these cases was sufficiently severe to come to the attention of the health authorities in the area.

To complete the proof of Zinsser's hypothesis, the only thing which remains is to recover living typhus rickettsiae from human

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† Professor of Microbiology, Dean, Harvard School of Public Health, 695 Huntington Ave., Boston 15, Mass.

TABLE 1

RICKETTSIAL DISEASES OF MAN

Group	Principal Diseases	Synonyms	Etiologic Agent	Usual Mode of Transmission to Man	Usual Occurrence
Typhus	Epidemic typhus	Classic, historic, human, European typhus	*Rickettsia prowazeki*	Human body louse	Winter and spring in cold climates over most of world
	Brill-Zinsser disease	Brill's disease, recrudescent typhus	*Rickettsia prowazeki*	Not established	U.S.A., Europe, probably world-wide
	Murine typhus	Endemic typhus, urban or shop typhus of Malaya	*Rickettsia mooseri*	Rat flea	World-wide
Rocky Mountain spotted fever	Rocky Mountain spotted fever	Spotted fever, tick fever, tick typhus, etc.	*Dermacentroxenus rickettsi*	Ticks	North and South America
	Fièvre boutonneuse	Button fever, Mediterranean fever	*Dermacentroxenus conori*	Ticks	Mediterranean countries and North Africa
	South African tick bite fever		*Dermacentroxenus pijperi*	Ticks	South Africa
	Rickettsialpox	Kew Gardens fever	*Rickettsia akari*	Mites	Northeastern U.S.A.
Tsutsugamushi disease	Scrub typhus	Mite-borne typhus, Japanese river fever, tropical typhus, rural typhus, Sumatran mite fever, etc.	*Rickettsia tsutsugamushi (orientalis)*	Mites	Korea, Japan, China, Formosa, India, Burma, Ceylon, Indonesia, the Philippines and Australia
Q fever	Q fever	Nine mile fever, Australian Q fever, Balkan grippe	*Coxiella burneti*	Probably airborne route; occasionally ticks; possibly milk	Australia, U.S.A., Panama, Europe, North Africa (probably world-wide)

subjects months or years after an attack of this disease, at a time when they are not ill and have not been exposed to rickettsiae in their environment. Although reports have not yet been published on this point, Dr. Price at Johns Hopkins has made a very interesting start in this direction. Published evidence of the persistence of the rickettsiae of scrub typhus and Rocky Mountain spotted fever in human tissue tends to strengthen and to broaden Zinsser's basic epidemiologic concept, even though *clinical* recrudescences of these two diseases have not been described. In view of present evidence, we must be alert to recognize recrudescences of each of the rickettsial infections if they are now occurring in the category known as "fever of unknown origin."

Recently, Dr. Mooser made a valuable suggestion with which I concur. He proposes the name Brill-Zinsser disease to describe the recrudescence of epidemic typhus, thereby paying tribute to the contributions of these two men. This term will eliminate confusion as to etiology, which arose because flea-borne typhus was called Brill's disease for many years.

There are no new developments in the epidemiology of scrub typhus which are not adequately and completely covered in the recent Technical Bulletin (TB Med 31—AFP 160-5-7) issued by the Departments of the Army and the Air Force, Washington 25, D.C., 26 August, 1954.

With respect to Q fever, I wish to stress the significance of recent findings which indicate the enormous numbers of these organisms which may be found in the placentas of sheep and goats. You are all thoroughly familiar with the fact that Q fever is most

often an air-borne infection. The resistance of the micro-organism to drying and its abundance in the milk and placentas of infected animals must be taken into full consideration by those responsible for prevention of this disease in military forces. Close cooperation with laboratory officers is particularly important here, inasmuch as the micro-organisms do not produce any evidence of illness in the infected cattle, sheep or goats.

Immunology

The efficacy of killed typhus vaccine in the prevention of fatal infection is well established. Still under scrutiny, however, is the problem of the optimum manner of administration of typhus vaccine. Dr. Edward Murray has been conducting a long-range program to elucidate the immunological developments under different immunization schedules. His work is not ready for final presentation, but I may say that we are optimistic at the present time that a simplification for military use will be recommended at the end of his study. A single primary dose of typhus vaccine may prove to be adequate as a foundation for the optimum booster response, even though several years elapse between primary and booster doses. We have no concrete evidence at the moment to indicate the value of the second dose of typhus vaccine ten days or two weeks after the primary dose. This statement is based on recent serological studies and not upon field trials.

We have been complacent for years that our standard laboratory strain of epidemic typhus, which is referred to as the Breinl strain, has complete antigenic coverage for epidemic strains the world over. In regard to the antigen for diagnostic tests, Dr. Murray has recently obtained evidence which may disturb this complacent view. It may be necessary for us to revise this concept, but I can offer this statement only as a progress report.

Important work on the trial of living avirulent typhus rickettsiae for immunization of man is currently being conducted by Dr. John Fox in Peru. These experiments are interesting, particularly to civilian authorities, but present information does not lead me to suggest consideration of the avirulent strain for military use.

Dr. Smadel and his colleagues, by their energetic and skillful field work in the Far East, have brought out certain fundamental concepts in the immunology of scrub typhus which deserve further emphasis in our discussion today. An attack of scrub typhus induces immunity to the *infecting* strain for several years and, concomitantly, there may be a transient period of partial immunity to heterologous strains of scrub typhus which fades after a few months. This observation correlates well with the wide variation which has been demonstrated in the antigenicity of scrub typhus strains as manifest in neutralization tests or in complement fixation tests. For this audience, the important point is that scrub typhus may occur more than once if exposure to multiple strains occurs. Since there is no satisfactory immunizing agent, it is clear that preventive measures are of paramount importance. Use of repellents and careful preparation of locations which are to be used as new camp sites, followed by appropriate application of rodenticides constitute the bulwark of our defense against scrub typhus.

In respect to Q fever, there is the possibility that an adequate immunizing agent can be available if there is reason to suspect a high attack rate in a military operation. The vaccine is somewhat toxic in its effect on man and is not to be recommended for widespread use without due consideration of this fact. The prompt response of patients to chemotherapy may serve to diminish interest in the attempt to immunize large groups who may be at risk.

Diagnosis

In Table 2, I have summarized our current information on diagnosis on rickettsial infections. This Table should be prefaced by the statement that in my opinion the attempt to isolate the causative agent of these diseases should not be undertaken by the ordi-

TABLE 2

SEROLOGIC TESTS FOR DIAGNOSIS OF RICKETTSIAL INFECTIONS

Rickettsial Infection	Complement Fixation (CF) Tests with Rickettsial Antigens					Weil-Felix (WF) Reaction		
	Epidemic typhus a	Murine typhus a	RMSF b	Rpox b	Q	OX19	OX2	OXK
Epidemic, louse-borne typhus	++++	+ or 0	0	0	0	++++	0 or +	0
Brill-Zinsser disease	++++	+ to ++++ c	0	0	0	0 d	0	0
Murine, fleaborne typhus	+ or 0	++++	0	0	0	++++	0 or +	0
Rocky Mountain spotted fever (RMSF) e	0	0	++++	++++	0	++++ or +	+ or ++++	0
Rickettsialpox (Rpox)	0	0	++++	++++	0	0	0	0
Scrub Typhus (Tsutsugamushi disease) f	0	0	0	0	0	0	0	++++
Q Fever	0	0	0	0	++++	0	0	0

++++ = titer in serial serum specimens changes more than four-fold.

\+ = slight rise in titer; not diagnostic.

a = washed, specific antigens.

b = results in these columns refer to commercially available soluble type antigens; the highly purified antigens prepared by the Army Medical Service Graduate School are specific for their homologous diseases and can be used to distinguish the various members of the RMSF group.

c = the CF titer vs. specific murine antigen is usually high in Brill-Zinsser disease; however, it is later in reaching its peak and is regularly at least 2 to 4 fold less than the titer vs. epidemic antigen.

d = WF may be positive in Brill-Zinsser disease.

e = the serologic reactions in boutonneuse fever and South African tick bite fever are similar to those of RMSF with commercially available antigens.

f = there are many antigenically distinct strains of scrub typhus; there is no satisfactory CF antigen generally available

nary military field laboratory, in view of the fact that workers in several laboratories during the past decade have clearly established the value of serologic techniques for diagnostic purposes. Rickettsiae are notorious for the many infections they have caused in laboratory workers, including several which were fatal; *attempts to isolate these organisms, therefore, should be made only when adequate facilities for protection of laboratory personnel are available.*

Antigens can be obtained from commercial sources which are suitable for the diagnosis of typhus Rocky Mountain spotted fever and Q fever, using the CF test. There is not a satisfactory antigen for the scrub typhus group. The Weil-Felix reaction should be used in addition to the CF test, provided two important features are kept in mind. In Brill-Zinsser disease the Weil-Felix test may be negative. This is more likely to be true if the interval is short between the primary attack and the recrudescence. The second feature is that antibodies to the proteus group usually drop to a level below the diagnostic value in a matter of weeks or months after an attack of the disease, whereas CF antibodies probably persist for many years in the typhus and spotted fever groups.

The Army Medical Service Graduate School has developed specific antigens which serve to distinguish in CF tests the various members of the Rocky Mountain spotted fever group from one another, but the commercial antigens are group reactive. A new development in serologic work has come from my colleague, Dr. Robert Shih-man Chang, who has devised a way to obtain antigens which sensitize red blood cells from some of the rickettsiae. As yet, the repro-

ducibility of Chang's work has not been reported from other laboratories. We anticipate that his procedure, which is simpler than the CF test, may eventually have a place in the routine diagnosis of typhus and spotted fever.

In the preceding section on immunology, Dr. Murray's recent observation was mentioned, which suggests that the Breinl strain has an antigenic pattern which is different from recently-isolated typhus strains in Yugoslavia. It is important to bear this in mind because it may have some influence on our choice of diagnostic methods in future work.

The least satisfactory diagnostic test shown in Table 2, is that for scrub typhus. We lack a sensitive and accurate CF antigen which is broad enough to include the many strain variations which occur in this disease. Unfortunately, Dr. Chang's erythrocyte sensitizing substances have not been obtained from scrub typhus.

Prevention and Control

Epidemic typhus—The recent appearance of human body lice which are partially or completely resistant to DDT has stimulated the interest of typhus workers in a more effective insecticide to which lice do not become resistant. A wide field of research is thus opened, which should be intensively pursued. The gamma isomer of benzene hexachloride seems to be effective against lice which are resistant to DDT, but this should not lessen our interest in finding more effective agents to be used in louse control.

Scrub typhus—It was mentioned earlier that our first and only line of defense is directed against the mite vector by means of repellents to be impregnated in clothing, the elimination of mites from the environment of camp sites by appropriate preparation of such areas, and by elimination of the rodent hosts upon which the mites depend.

Q fever—Despite our knowledge of the airborne route of infection and of certain important sources for the contamination of air, it is not possible to outline a program of prevention and control which has been demonstrated to be effective under field conditions. Defense against the use of Q fever by enemy forces is a problem of joint concern to the military and civilian defense authorities. Evaluation of this hazard is not appropriate in this type of general discussion. Use of vaccine against Q fever has been mentioned above.

Treatment

In the short space of six years the entire outlook on therapy of rickettsial infections has been changed from one of helplessness to one of optimism. The beautiful work of Dr. Smadel and his several associates laid the foundation of our present knowledge of the effectiveness of chloramphenicol and the tetracycline drugs. Ley and Smadel in their recent review have written a discussion and summary which is so concise and informative that I quote directly:*

"It is apparent that all three broad-spectrum antibiotics currently available are effective in treatment of rickettsial diseases of man in daily oral doses of 50 to 60 mg./Kg. body weight, supplemented by an initial loading dose. With certain diseases, particularly scrub typhus, the institution of specific therapy early in the course of disease has resulted in recrudescence of illness after the rickettsiostatic effect of the drug has been dissipated and before the patient has had sufficient time to develop his own immunologic defense. In such instances an additional short, 24-hour course of antibiotic is indicated about six days after the end of the first course to prevent relapse until the patient's immunity mechanisms can control the infection.

"It is difficult to convey the significance and the extent of the changes in therapy of rickettsial diseases that have resulted from use of the broad-spectrum antibiotics. Of the 588 patients mentioned in this review, who have been treated by various groups of investigators in different parts of the world, not a single death has been reported in persons receiving adequate dosages of anti-

* Antibiotics and Chemotherapy, vol. 4, July, 1954, pp. 792-802.

biotic before the terminal stages of disease. Furthermore, we know of no unpublished instances in which the broad-spectrum antibiotics, given a reasonable chance, may be said to have failed and to have permitted the rickettsioses to proceed to fatal conclusion. The present results seemed almost impossible only a few short years ago, and today one recalls with difficulty the prolonged febrile courses and the frequent deaths of patients with rickettsial diseases. The efficacy of these therapeutic agents and their rapidity of action have increased the need for early diagnosis of the rickettsioses and have modified the application of immunization and vector control under certain circumstances. Thus, it may be more practical to treat the few cases of rickettsial disease that develop annually in an endemic area than it is to apply control measures to the entire population exposed to risk. We have in mind, for example, Rocky Mountain spotted fever in the central Atlantic states or boutonneuse fever in some Mediterranean areas.

"The clinical experience with specific rickettsiostatic antibiotics summarized here is so satisfactory that there is no longer a strong motivation to search for other rickettsiostatic agents. However, should an antibiotic be found which in the laboratory is both rickettsiocidal and nontoxic, it would be worthy of immediate clinical investigation."

Summary

Epidemic typhus, scrub typhus, and Q fever have constituted problems of military importance under certain circumstances. Recent developments in knowledge of epidemiology, immunology, insect control and chemotherapy have greatly reduced the magnitude of the threat posed by these diseases. There are several gaps, however, in our information, and thus continuing research on rickettsial diseases is clearly warranted.

U. S. Atomic Power for Peace Program Brings Egyptian Scientists to National Naval Medical Center

Drs. Mahmoud (left) and Sallam (center), of the University of Cairo, adjust the scintillation counter to Vernie Ward, HM1, USN as Lt. W. B. Looney, MC, USN (right), looks on. The scintillation counter is used to determine the status of the thyroid glands. These medical scientists, the first to benefit under the President's "Atomic Power for Peace" program, will complete studies here and at Oak Ridge, Tenn.

Acute Respiratory Diseases in Recruit Training Stations—Etiology, Prevention, and Control*

By

COMMANDER JOHN R. SEAL (MC), *U. S. Navy***

(With two charts)

COMMON acute respiratory diseases can be subdivided into those of known and unknown etiology. Known etiological agents causing frequent major epidemics in the Navy have been influenza viruses and group A streptococci. Respiratory infections caused by other known agents have occurred infrequently. During the past year, reports have been made of new viruses isolated by tissue culture technics.[1,2] These viruses have been termed "adenoidal-pharyngeal-conjunctival (APC) agents" by one group of workers after the sites from which they have been isolated and the clinical manifestations in an outbreak of febrile respiratory illnesses attributed to one of the viruses.[3] Another of the new viruses (termed RI-67) has been related to some respiratory infections in military personnel hitherto classified as being of unknown etiology.[2] The proportion of respiratory infections to be removed from the status of unknown etiology and assigned into the group with known etiology as a result of discovery of these new viruses cannot be determined as yet. Even though it may prove to be considerable, it is more convenient in this paper to avoid speculation as to the rôle of these viruses in epidemics of respiratory infections within the Navy prior to 1954.

Acute respiratory diseases in military populations were studied extensively during and immediately subsequent to World War II and the overall problem caused by these diseases in Navy recruit populations is well known.[4-7] Observations made by the Naval Medical Research Unit No. 4 at the Great Lakes Naval Training Center during the past six years have to some extent further defined the problems posed by influenza and streptococcal infections in recruit and other populations under present conditions at this station. Whenever studied, the experience at Great Lakes has been more or less reduplicated at other naval training centers. It is also assumed, from the behavior of incidence rates for acute respiratory diseases and rheumatic fever,[8] that the same problems exist among Marine Corps recruits, but few observations have actually been made.

Many details concerning populations, methods, and strains of influenza or beta hemolytic streptococci causing epidemics at Great Lakes have been published elsewhere and will not be repeated here. Rather, the general experiences of the six years of observation at the Naval Training Center, Great Lakes, are summarized and related to the incidence of respiratory diseases in all naval installations within the continental United States.

TERMINOLOGY

With few exceptions, clinical diagnoses assigned by infirmary medical officers in accordance with standard nomenclature have had little relation to the etiology of acute respiratory infections and have been of little

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** Formerly Officer In Charge, Naval Medical Research Unit No. 4, U. S. Naval Training Center, Great Lakes, Illinois. Now Head, Communicable Disease Control and Environmental Sanitation Branches, Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D.C.

The opinions and assertions herein are those of the author and cannot be construed as representing the views of the Navy Department or the Naval Service at large.

value in epidemiological descriptions. Diagnoses, such as acute pharyngitis or acute bronchitis, based upon the location of major signs or symptoms have been assigned to infections of diverse etiology. The diagnosis of streptococcic sore throat has been made infrequently, despite the occurrence of demonstrated epidemics of these infections. In at least one epidemic of influenza (1950) practically all cases were diagnosed as "Common Colds" by the physicians in the infirmaries, despite the presence of fever and systemic symptoms in most patients. Accordingly, only the total admissions with a diagnosis of any kind of respiratory infection have been used in the calculation of admission rates, with no effort made to subdivide admissions by the usual clinical classifications.

In most clinical studies, the system of classification used by the Commission on Acute Respiratory Diseases[5,9] has been followed. This system is based upon the presence or absence of certain objective findings in non-pneumonic respiratory infections. Illnesses characterized by exudative lesions of the tonsils or pharynx were subdivided into streptococcal or non-streptococcal etiology according to whether there was bacteriologic and/or immunologic evidence of streptococcal infection. Most such illnesses were characterized by fever, cervical adenitis, systemic symptoms, and a leukocytosis which varied in degree between streptococcal infections and infections of other etiology. Large numbers of patients with exudative tonsillitis or pharyngitis have been seen only during epidemic streptococcal infections. Illnesses in which fever and systemic symptoms were absent or minimal and in which the major symptoms were confined to the upper respiratory tract, with rhinitis being a prominent symptom, were termed "common cold-like." Those with fever, systemic symptoms, and more generalized involvement of the respiratory tract were termed "acute undifferentiated respiratory diseases (ARD)." Where laboratory evidences of either streptococcal infection or influenza were present in these illnesses, the etiological diagnosis was assigned regardless of clinical findings.

No attempt has been made to define an epidemic other than in terms of unusual prevalence of illness in the population. Since group A streptococci are recovered from only a very small percentage of new recruits arriving at a station and, at certain seasons or in some years, recruits complete their training with few additional men yielding bacteriological, immunological, or clinical evidence of spread of the organisms within the population, any period in which evidences of spread occurred was considered an epidemic period. In the case of influenza, an epidemic refers to a period in which influenza A, B, or C viruses were recovered from patients with more than very sporadic frequency. Except for influenza C, this has occurred only during periods in which admission rates were elevated over previous levels.

The Special Problem of the Naval Training Center and the Recruit

Although the medical problem of the new recruit is not confined to acute respiratory diseases, he contributes a disproportionate share of the total incidence and hospital days for acute infectious diseases within the Navy each year.[8] With an average strength of less than ten per cent of the total average strength of the Navy, the recruit population has contributed from 30 to 40 per cent of the total admissions diagnosed as acute respiratory infections during each of the past several years. Even when the total number of men entering recruit training in a year is considered, instead of the average strength of the recruit population, the incidence of respiratory diseases in recruits remains disproportionate. The effect of this high incidence of respiratory diseases in the recruit population upon the reported incidence at a Naval Training Center as a whole, or on incidence in all naval activities within the continental limits of the United States, is illustrated in figure 1.

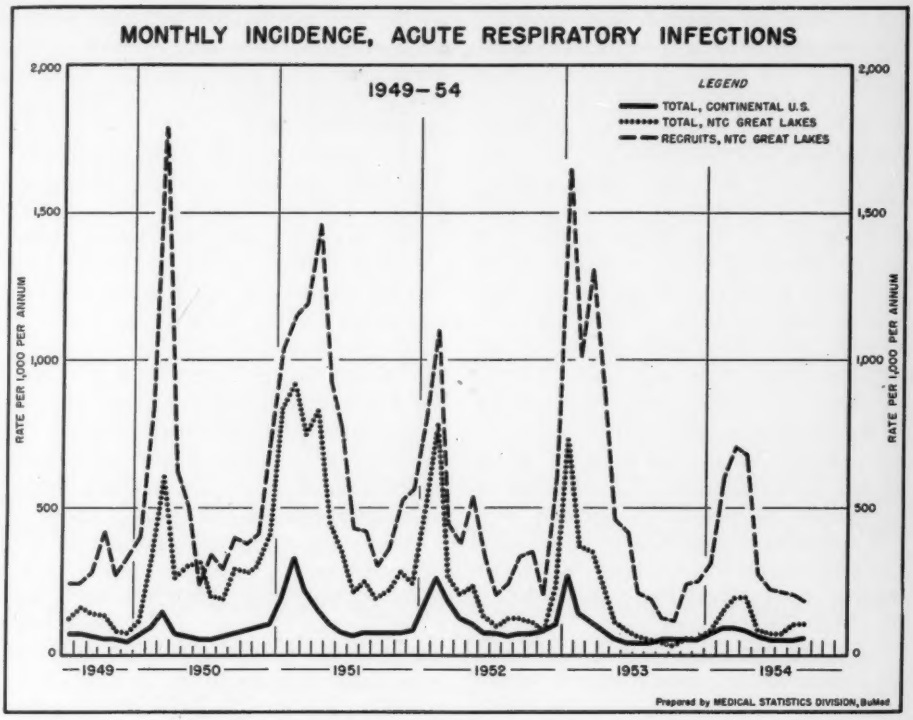

FIG. 1. Monthly incidence of acute respiratory infections in male recruit population and entire Naval Training Center, Great Lakes (including recruits) compared to incidence in all Naval installations, continental United States (includes all Training Centers), 1949-1954.

A Naval Training Center is made up of many distinct populations. New recruits arrive almost daily from civilian life. In the order of arrival they are formed into companies containing from 50 to 80 men, depending on circumstances, before entering scheduled training. Men in a company not only share a large open dormitory but are kept in intimate contact with each other for most of each 24-hour period throughout their training. Despite a busy schedule of company activities during training, there are widespread contacts between men and companies in the same and different regiments and more limited contacts with non-recruit personnel, particularly those belonging to the medical and dental departments. Evidence indicates that in most companies of recruits, the initial streptococcal infections are acquired outside of the barrack and company after the recruits arrive in training.[10] It is reasonable to believe that this also applies to other etiological agents.

Epidemics in the recruit population are a composite of epidemics in individual companies of recruits. Great variations in the amount of illness may exist between companies which enter training simultaneously, and it is probable that the continuous intimate contact of men within the company is a major factor in determining the degree of spread of an organism once it gains access to the company. Typically, an epidemic of common cold-like illnesses of unknown etiology sweeps through nearly all recruit companies within their first weeks of training. This is reflected to some degree in outpatient treatments, but not in admission rates,

and occurs at all seasons.[11] Most acute undifferentiated respiratory infections occur during the first month of training and admissions thus classified become infrequent in the late weeks of training. When epidemic, streptococcal infections tend to peak about the middle of the three month training period and then decline. The carrier rate tends to increase throughout training and it is not unusual to find 60 to 80 per cent of the men in a company in the final week of training with positive cultures for beta hemolytic streptococci. At the onset, epidemic influenza involves men in all weeks of training. After two or three weeks of prevalence in the majority of recruits, it is more or less confined to and continues in newly formed recruit companies for a number of weeks after the epidemic is seemingly over.

A second large population at Naval Training Centers are the students in Service Schools. A majority of these men have just completed recruit training and undergo about three additional months of specialized training in these schools; some remain for nearly a year. Most students live in barracks similar in construction and space allowance per man to those occupied by recruits but in a different area on the Center. A major difference between Service School students and recruits, over and above hypothetical differences in their immune status as a result of "seasoning" while in recruit training, is the fact that students are allowed much more freedom from each other in their training and recreation. They also have more extensive casual contacts with civilian populations than do recruits.

Excepting staff personnel and instructors of the training commands, a large percentage of the remaining enlisted personnel are organized for administrative and accounting purposes under the Administrative Command (AdCom). This is a heterologous population and many of its members live with their families off the station. At work, these men are subdivided among many departments and their prolonged intimate contacts with other service personnel are limited for the most part to other personnel within the department. Some, such as medical and dental department personnel, have contacts with all groups, including recruits and Service School students.

Two distinct medical departments exist. One, under the Administrative Command, provides outpatient care and treatment for military personnel, operates infirmaries with a number of beds for the short term care of acute illnesses and minor injuries, and is responsible for the health of personnel at the Center. The Naval Hospital is separate and receives patients requiring more definitive treatment or prolonged hospitalization as well as patients with shorter illnesses in excess of the capacity of the infirmaries. Hospital Corps schools are similar to Service Schools, although not a part of them.

Policies concerning the admission or outpatient treatment of personnel seeking treatment for respiratory infections from the several populations are quite variable and make any comparison of illness which is based upon admissions to infirmaries or hospitals an unreliable index of the actual incidence of respiratory infections in the populations. No other accounting of new cases is made, however, and admission rates are necessarily used for whatever they may be worth. In figure 2 are shown the admission rates for all acute respiratory infections per 1,000 average strength per week from the three major populations of enlisted personnel at the Great Lakes Naval Training Center during the winter and spring months of the years 1949 through 1954. Also shown are the weekly average strengths of the three populations.

Admissions for acute respiratory infection from the recruit population have always exceeded those from other populations. With peak admission rates of 25 to 35 each winter, from 25 to 600 recruits have been admitted with respiratory infections weekly, depending upon the size of the population. The major differences in the several years have been not so much in the level attained by these rates but in whether high

rates have been sustained over a period of weeks or months. The average strength of the Service School and Administrative Command populations has varied less than that of the recruit population. Elevations in admission rates have been less marked and of shorter duration than in recruits. Without exception, a sudden and marked increase in the admission rates from both Service Schools and Administrative Command populations has coincided with the prevalence of influenza A (1949, 1950, 1951, 1953) or influenza B (1952, 1954) in all three populations. By reference to figure 1 it will also be seen that the peaks in incidence rates for all naval activities within the continental United States have coincided exactly with the occurrence of influenza in these populations at Great Lakes.

In 1952 and 1954, mass oral penicillin prophylaxis for epidemic streptococcal infections[12] altered the pattern of respiratory infections in recruits considerably. Although not reflected in admission rates to any great degree, streptococcal infections have also occurred in the Service Schools whenever prevalent in recruits. Service School populations at Great Lakes have not been studied as well as have recruits, but the extent of involvement in other populations, despite low admission rates, was particularly well illustrated in studies at the Naval Training Center, Bainbridge, Maryland, in 1953.[13] These papers also provide more or less detailed descriptions of the clinical and epidemiological features of epidemics of influenza, streptococcal infections, rubella, and other infectious diseases at that Naval Train-

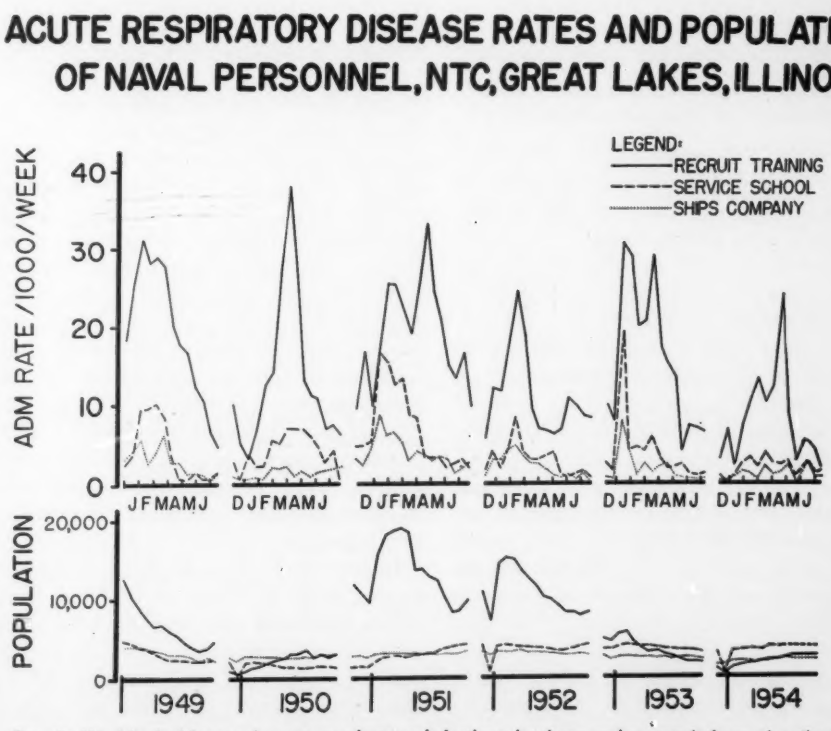

FIG. 2. Weekly incidence of acute respiratory infections in three major populations of enlisted personnel and weekly average strength of these populations during winter and spring, Naval Training Center, Great Lakes, 1949-1954.

TABLE I

CLINICAL CLASSIFICATION OF ACUTE RESPIRATORY INFECTIONS ADMITTED BEFORE AND DURING "INFLUENZA" EPIDEMIC IN NAVY RECRUIT POPULATION OF ABOUT 2,000 MEN, 1950

Relation to Epidemic		Before	During
Inclusive dates		1/6 to 2/18*	2/25 to 3/25
Average number patients admitted weekly		17	82
Total admissions		100	329
Percent of illnesses classified as—	Acute undifferentiated respiratory infection	72	80
	Nonstreptococcal exudative pharyngitis	14	13
	Streptococcal exudative pharyngitis	9	1
	Pneumonia	5	6
Number nasal washings collected		15	60
Number influenza A viruses isolated		1**	20
Number influenza B viruses isolated		2	0

* Transitional week ending 2/25 omitted.
** From patient admitted on 2/18.

ing Center and the effect of mass penicillin prophylaxis on these features.

THE ETIOLOGY OF ACUTE RESPIRATORY DISEASES IN NAVY RECRUITS DURING SEASONS OF HIGH PREVALENCE

Except in 1950, peak admission rates from the recruit population shown in figure 2, have occurred when both influenza and streptococcal infections were prevalent.

In February 1950, a rather abrupt epidemic occurred in the recruit population which numbered about 2,000 men. The epidemic lasted four weeks and declined as abruptly as it occurred. Concurrently, a slight elevation in admission rates occurred from the Service Schools but not from the Administrative Command. Patients admitted to the recruit infirmary were routinely studied.[11] The clinical classification of patients admitted during the six weeks period prior to the onset of the epidemic and the four weeks of the epidemic is shown in table I.

The majority of patients admitted before and during the epidemic had a febrile respiratory infection with no distinctive physical or roentgenographical findings and were classified at the time of initial examination as "acute undifferentiated respiratory disease." Non-streptococcal exudative tonsillitis or pharyngitis were found in about the same percentage of patients before and during the epidemic, indicating that a fivefold increase in admission of patients with this clinical syndrome had occurred. Streptococcal infections were uncommon and did not increase during the epidemic. Pneumonias increased in the ratio of the increase in total admissions, and few of the cases in either period which were studied could be classified as primary atypical pneumonia, although this diagnosis was usually assigned.[14] Thus, there was no marked change in the clinical manifestations of illnesses seen during the epidemic, the major phenomenon being the fivefold increase in total admissions for acute non-streptococcal respiratory infections with a slightly higher percentage of illnesses being classified as "acute undifferentiated respiratory infections."

During the four week period of the epidemic, nasal washings and paired blood serum specimens were obtained from a majority of patients admitted at the regular sick calls with fever and symptoms of less than 48 hours duration.[11] In the two weeks of highest rates, specimens were obtained from 30 to 40 per cent of the total patients admitted because of respiratory infections.

Only one-third of the cases from which specimens were obtained could be identified as having influenza by laboratory methods, yet the average number of admissions were increased fivefold, and the epidemic appeared to be caused by a single disease. This observation has been made in other years and has raised the question as to whether present laboratory methods are inadequate to confirm many cases of influenza or as to whether, for some unknown reason, outbreaks of non-influenzal respiratory infections usually occur simultaneously with influenza epidemics. With few exceptions, virus isolations were obtained only from patients with recent onset of illnesses classified as "acute undifferentiated respiratory infections." Serological data suggested that about 20 per cent of the total population experienced influenza during this epidemic. Approximately 10 per cent of the total recruits available during the four week period were admitted because of a respiratory infection.

In 1951, both influenza and streptococcal infections became epidemic.[10,15] Influenza occurred in all populations during January as illustrated in figure 2. After the peak incidence of influenza subsided, an increasing incidence of streptococcal infections in recruits caused the second peak and high admission rates for respiratory infections continued into June. Influenza also continued to occur in new recruit companies, including those entering training as late as March.[15]

Sixteen recruit companies with a total of 1,095 men were specially studied during that winter in connection with studies on tri-ethylene glycol vapor.[10] Weekly examinations, including nose and throat cultures, were made on the men in their barracks. Routine immunological studies were also made. Studies were also made on men from these same companies voluntarily seeking treatment at the recruit infirmary because of respiratory infection. All respiratory infections occurring in this population were classified by all available data.

As summarized in table II, a total of 1,361 new respiratory infections were acquired by these men after entry into training. This excluded illnesses present on arrival at the station or occurring in the receiving camp. Of these, 899 (66 per cent) could not be classified as being of known etiology. Men sought treatment for only 297 of these 899 infections. Only 114 of the 297 were admitted with febrile illnesses. A majority of the 899 were common cold-like illnesses but it was not unusual to find men in the barracks with a fever of 103° F or higher who had not sought treatment. Another group of about 300 men were similarly studied during March and April with essentially similar results.[15]

These data illustrate the proportion of total respiratory illnesses occurring in Navy

TABLE II

TOTAL NEW RESPIRATORY INFECTIONS ACQUIRED BY 1,095 NAVY RECRUITS DURING TRAINING AND PROPORTION FOR WHICH MEN VOLUNTARILY SOUGHT TREATMENT, WINTER 1950–51

Etiology of Respiratory Infection	Respiratory Infections					
	Total		Treated at Infirmary			
			Outpatient		Inpatient	
	Number	Percent	Number	Percent	Number	Percent
Unknown	899	66.0	183	75.6	114	52.4
Streptococcal infection	319	23.4	33	13.6	66	30.2
Influenza	143	10.6	26	10.8	38	17.4
Total	1,361	100.0	242	100.0	218	100.0

recruits that could be identified as being of known etiology by laboratory methods available during that winter. Men sought treatment for about one-third of the total illnesses, regardless of etiology. Of those seeking treatment, one-third of the cases of influenza or streptococcal infection identified by laboratory methods were not sufficiently ill or did not have sufficient fever (100° F or over was generally cause for admission) to warrant admission in the opinion of the regular infirmary physicians who examined them. Since nearly all observers who have studied respiratory infections in military populations have made similar observations, the futility of attempts to control epidemics of infectious diseases in these populations by isolation or treatment of patients is evident. It is also evident that therapeutic procedures, however adequate, confined to that segment of the total illnesses which normally comes to the attention of the medical officer, cannot be expected to prevent a large proportion of the complications and sequelae of respiratory infections in these populations.

Laboratory evidences of epidemics of both influenza B and influenza C* were obtained in recruits and other populations during the spring of 1952.[16] Streptococcal and other respiratory diseases were also prevalent in the recruit population.[12] Immunological tests were performed on the blood sera of nearly half of all patients admitted with respiratory infections between January 13 and February 9. Significant increases in antibody titer against influenza A occurred in 4 per cent, and against influenza B in 12 per cent of the pairs of sera collected in this interval. Laboratory evidences of influenza C infection appeared to be more related to minor respiratory illnesses than to febrile illnesses although present in patients in the latter category.[16]

In January 1953, coinciding with epidemics elsewhere, an epidemic of influenza A occurred in all populations at Great Lakes. Following the epidemic, streptococcal infections became prevalent in the recruit population.[17] Streptococcal infections were prevalent in the Service School students before and after the epidemic.[13]

The epidemics at Great Lakes were not as well studied as in other years because of the preoccupation of a large part of the Research Unit staff with similar epidemics at the Naval Training Center, Bainbridge, Maryland.[13] At that Center, during the influenza epidemic, 155 (80 per cent) of 199 patients admitted from non-recruit populations had non-streptococcal acute undifferentiated respiratory infections with systemic symptoms, whereas only 139 (40 per cent) of 352 recruits admitted in the same period were classified in this category. The major difference at this time was due to the greater percentage of recruits admitted with streptococcal infections, which tended to mask the influenza epidemic to some degree. Following the influenza epidemic, streptococcal and other respiratory infections were classified in about the same percentage of patients admitted from the several populations, the major difference being in the admission rates. Twenty-nine per cent of the total admissions because of respiratory infections from the Service School and Administrative Command occurred in the three week period of major prevalence of influenza in January 1953. Thus, over one-quarter of the patients were admitted in only 12 per cent of the 25 total weeks of observation. The classification of illnesses admitted during the study periods at Great Lakes and Bainbridge during this winter is shown in table III. Since the study periods are not identical, differences in percentages classified in the several categories are of no concern and the data are presented mainly because the more complete etiological studies at Great Lakes provide information as to influenza. Streptococcal infections became more prevalent and formed a high percentage of the admissions later in the spring and had observations at Great Lakes been continued longer, they probably would have approximated the percentage found at Bainbridge.

* This was the first winter in which routine studies were made for influenza C.

With the reporting of the new group of viruses related to epidemic respiratory infections in military personnel, there was further opportunity to etiologically categorize respiratory infections at Great Lakes in the winter of 1953-1954. Special studies were made among recruits seeking treatment for acute respiratory infections between January and May. A complete clinical workup, total leukocyte count, nasal washing, nose and throat culture, sputum culture, and paired sera were obtained on all individuals presenting themselves at regular sick call with febrile respiratory infections. Identical study was made of every third patient with a respiratory infection and fever of less than 100° F and of every third patient with a complaint other than respiratory infection. This study was made in collaboration with Doctor Robert J. Huebner and his associates of the Microbiological Laboratories, National Institutes of Health, Bethesda, Maryland. Preliminary results indicate that epidemics of streptococcal infection, influenza B and C, and of the new viruses occurred. Some of the information on streptococcal infections has been presented elsewhere.[12] A total of 31 "APC" viruses have been isolated and those that have been immunologically identified have all been of the same type as the RI-67 recovered by Hilleman from Army personnel.[2] Practically all have been recovered from patients with non-streptococcal, non-influenzal febrile respiratory infections in which sore throat has been an outstanding symptom.

In all studies over the six winters, efforts have been made to identify other etiological agents by a variety of methods without significant results. The difficulties in establishing exact diagnoses of streptococcal infections and influenza, the finding of superimposed or dual infections, and the great diversity of clinical syndromes and epidemiological behaviors of diseases of known and unknown etiology, have made these studies quite complex. As a result, a really competent evaluation of the problem of diseases of unknown etiology cannot be made although it appears that about half of the total admissions in most winters may have been in this category. It may be significant that well defined epidemics, other than those due to influenza and streptococcal infections, have not been encountered in the six years. While it is hoped that the studies made in the spring of 1954 will shed more light on the problem when they are completed, it now appears that it will be necessary to institute highly effective control measures against both influenza and streptococcal infections

TABLE III

ADMISSIONS FOR ACUTE RESPIRATORY INFECTIONS FROM RECRUIT POPULATION AT GREAT LAKES AND FROM RECRUIT, SERVICE SCHOOL STUDENT, AND ADMINISTRATIVE COMMAND POPULATIONS AT BAINBRIDGE, WINTER 1952–53

Naval training center	Great Lakes	Bainbridge		
Inclusive dates	11/7/52–3/3/53	1/6/53–5/30/53		
Population	Recruit	Recruit	ServSch	AdminComd
Total patients classified	265	2,388	259	211
Percent classified	100.0	100.0	100.0	100.0
Streptococcal infection	28.7	36.1	31.6	36.5
Influenza	13.9	*	*	*
Pneumonia	1.9	6.5	2.3	2.8
Other	55.5	57.4	66.1	60.7

* Routine serological studies not made, classed with "other."

before any realistic evaluation can be made of the problems posed by diseases of other etiology in the recruit populations.

Prevention and Control of Acute Respiratory Diseases

In the history of most infectious diseases indigenous to man, highly effective control has not been possible until the etiological agent was identified and more or less specific methods of prevention developed. As has been pointed out, a majority of respiratory infections occurring at a Naval Training Center and in the recruit population must still be regarded as of unknown etiology. All efforts to control acute respiratory infections in the recruit population by use of such non-specific measures as ultraviolet irradiation, triethylene glycol vapor, or dust suppressive measures have shown that while percentage reductions in illness may have been effected, epidemics continue in the populations living in the treated environments.[18] Variations in crowding, temperature, humidity, clothing, exposure, and stress may influence rates of spread and/or attack rates to some degree but there has been no evidence advanced thus far that alteration of these factors within practical limits will prevent or control epidemics in such populations as military recruits, despite the many popular beliefs in this direction.

It has been demonstrated again in recent years that influenza vaccines of the proper composition will appreciably reduce not only clinical illness diagnosable as influenza by serological methods or virus isolation, but total incidence of illness during influenza epidemics.[19-22]

Epidemics of influenza are not confined to recruit populations at a Naval Training Center and the problem of vaccination of recruits against this disease is only a part of the general problem in the Navy. The justification in a recruit group may be greater, however, since epidemics are often superimposed on already high morbidity rates for respiratory diseases. Incapacitation of an additional 10 to 20 per cent of the recruit population within a period of three to four weeks, seriously impairs training programs. Medical facilities may be badly overtaxed by the sudden marked increase in patient load. The spread of some diseases, such as streptococcal infections, between companies and into other populations may also be facilitated by the concentration of men in large open hospital or infirmary wards. A major consideration in the use of influenza vaccines, therefore, is not the prevention of an illness which is usually mild and transient in the individual, but rather it is the effort to avoid the military and medical problems created by a large number of such illnesses within a short space of time.

Epidemic streptococcal infections can be controlled to a very great degree by the intelligent use of oral penicillin prophylaxis. Studies have been carried on in the Navy,[12, 13, 15, 23] since 1951 and have been correlated with studies made at Air Force Bases,[24, 25] through the Commission on Streptococcal Infections of the Armed Forces Epidemiological Board. Studies so far made can be summarized as having shown:

1. Epidemics of streptococcal infection can be effectively, and for all practical purposes, completely interrupted by administration of oral penicillin in a dosage of 250,000 units twice daily. When the administration of mass prophylaxis was carefully planned and effectively supervised, few cases of streptococcal infection occurred during the administration of this dose of penicillin. The incidence of purulent complications and non-purulent sequelae were correspondingly reduced. If this dosage was continued for 10 or more days, carrier rates for group A streptococci were reduced to a small fraction of the pre-prophylaxis rates. These effects were gradually lost after administration was stopped.

Larger doses of oral penicillin offered no advantage. Smaller doses, even as small as 50,000 units once daily, when instituted during an epidemic and given to the whole population, reduced admission rates to a rather marked degree but did not prevent

all infections and were much less effective in reducing the incidence of carriers in the population.

2. When individuals with a past history of penicillin reaction were exempted from the program, sensitivity reactions occurred in about three-tenths of one percent (0.3 per cent) of men receiving penicillin for periods up to 8 weeks and most of the reactions were mild and transitory.[12] The risk of a reaction has been much less than the risk of a streptococcal infection and subsequent serious complication or sequel in uncontrolled epidemics.

3. Penicillin resistant strains of group A streptococci have not been demonstrated to occur in nature or as a result of mass prophylaxis.

Much experience has been gained in the control of streptococcal infections among Navy recruit populations in these studies. Although continuous prophylaxis with small doses of oral penicillin would prevent an epidemic from occurring or prevent the recurrence of an epidemic after it had been interrupted with the 500,000 unit daily dose, such a program is not practical. Supervision of administration of the daily dose must be delegated to the line petty officers acting as company commanders and these non-medical personnel do not uniformly and readily accept the responsibility for long continued supervision of the program. The failure of the tablets to prevent non-streptococcal respiratory infections quickly reduces their acceptability to new recruits who often blame them as causing these infections and vigorously avoid taking them whenever possible. Furthermore, it is difficult to predict epidemics and in some winters anticipated epidemics have not materialized.

The recommended method for using oral penicillin at present is the intermittent administration of 10 day courses of 250,000 units twice daily. This requires that careful clinical and laboratory observations be made to detect beginning or recurrent epidemics and that a course of prophylaxis be instituted as early as the epidemic or recurrence can be confirmed.

Recurrence of an epidemic may stem from numerous sources—the most important of which would seem to be uneradicated sources on the station. This would include carriers from which the organisms were not eradicated by the course of penicillin; men returning from hospitalization who have positive cultures as a result of inadequate treatment, cross-infection following completion of treatment, or who were carriers and entered the hospital for some reason not normally requiring penicillin therapy; and other populations on the station which did not receive prophylaxis. Virulent strains of streptococci may also be imported by newly arrived recruits; Service School students; other staff personnel; or by visitors, particularly children. Available evidence will not allow these potential channels to be accurately evaluated, but the newly arrived recruit coming from civilian life would seem to be less of a hazard than the Service School student coming from recruit training at another station.[13]

To minimize the possibilities of a recurrence after a course of penicillin, it has also been thought that all populations on the station, certainly those in which any streptococcal infections are occurring, should receive penicillin prophylaxis. Opportunity has not been afforded to test such a "base-wide" program which, it is hoped, will provide a much longer interruption of an epidemic than has so far been afforded by a 10-day course confined to the recruit population alone.

These investigations are being continued as there are still many problems concerning the best methods for administration of penicillin to provide the most effective control of streptococcal infections.

Identification of the new group of viruses related to respiratory infections with evidence that one type in particular may be a problem in military personnel has given rise to the hope that a vaccine will be possible and a further segment of the respiratory disease problem among recruits brought under control.

Summary

Observations made on acute respiratory diseases at the Great Lakes Naval Training Center by the U. S. Naval Medical Research Unit No. 4 during the last six winters have been summarized and related to epidemics at other Naval Training Centers and to the incidence of respiratory diseases at all naval activities within the continental United States. Epidemics within the recruit populations have been a major problem and caused a disproportionately large percentage of the Navy's problem with respiratory infections each winter. Almost annual epidemics of influenza and streptococcal infections, attended by high admission rates, have occurred in the recruit populations and have been responsible for about one-half of the total of new patients with acute respiratory infections.

Influenza A has usually occurred in well-defined epidemics, involving not only the recruit but other populations, and has been the only disease observed to cause simultaneous abrupt, marked increases in admission rates from both trainee and non-trainee populations. Influenza B epidemics have been less explosive and less marked, particularly in the non-recruit populations. Streptococcal epidemics have been protracted, usually reaching a peak in late March or April and gradually subsiding. Epidemic streptococcal infection in populations other than recruits has not been attended by high admission rates and has usually gone unrecognized, unless specially studied.

About one-half of the febrile respiratory infections admitted each winter have not been caused by any known etiological agent which could be demonstrated through laboratory studies. Despite this, well-defined epidemics caused by epidemiological entities of unknown cause have not been observed except in the case of common cold-like illnesses which sweep through newly formed companies of recruits without being evident in admission rates. That category or group of infections which has been termed "acute undifferentiated respiratory disease of unknown etiology (ARD)" has seemed to be more or less prevalent throughout the winter months in most winters but has been a difficult problem to evaluate because of concurrent epidemics of other respiratory diseases of known etiology. The preliminary results of studies made during 1954 tend to confirm those made by others in relating a new group of viruses to at least some of the illnesses classified as "acute undifferentiated respiratory disease."

Influenza vaccines should achieve significant reductions in the total respiratory disease incidence in the Navy if any major part of the illnesses caused by influenza viruses at Training Centers and in recruit populations are prevented. Practical methods for the control of epidemic streptococcal infections at training centers by use of oral penicillin prophylaxis have been evolved, although not fully perfected. Control of both influenza and streptococcal infections at the training centers are practical and necessary goals within the Navy. Further efforts at development of control measures must center about the identification of etiological agents, assessment of the problems caused by them, and, wherever possible, the manufacture of specific vaccines. Little can be expected of other preventive measures.

References

[1] Rowe, W. P., Huebner, R. J., Gilmore, L. K., Parrott, R. H., and Ward, T. G.: Isolation of a Cytopathogenic Agent from Human Adenoids Undergoing Spontaneous Degeneration in Tissue Culture. Proc. Soc. Exp. Biol. and Med. 84:570-573, 1953.

[2] Hilleman, M. R., and Werner, J. H.: Recovery of a New Agent from Patients with Acute Respiratory Illness. Proc. Soc. Exp. Biol. and Med. 85:183-188, 1954.

[3] (a) Huebner, R. J., Rowe, W. P., Ward, T. G., Parrott, R. H., and Bell, J. A.: The APC (adenoidal-pharyngeal-conjunctival) Agents, a Newly Recognized Group of Common Respiratory System Viruses. New Eng. J. Med. (In press).

(b) Parrott, R. H., Rowe, W. P., Huebner, R. J., Bernton, H. W., and McCullough, N. B.: An Outbreak of Febrile Pharyngitis and Conjunctivitis Associated with Type 3 APC Virus Infection. New Eng. J. Med. (In press).

[4] Coburn, A. F., and Young, D. C.: The Epidemiology of Hemolytic Streptococcus. Williams & Wilkins Co., Baltimore, 1949.

[5] Commission on Acute Respiratory Diseases. Acute Respiratory Diseases Among New Recruits. Am. J. Public Health 36:439-450, 1946.

[6] Sartwell, P. E.: Common Respiratory Diseases in Recruits. Am. J. Hygiene 53:224-235, 1951.

[7] Willmon, T. L., Hollaender, A., and Langmuir, A. D.: Studies of the Control of Acute Respiratory Diseases Among Naval Recruits. I. A review of a four year experience with ultraviolet irradiation and dust suppression measures, 1943 to 1947. Am. J. Hygiene 48:227-232, 1948.

[8] (a) Annual Report of the Surgeon General, U. S. Navy, Medical Statistics. NavMed P-5027, 1949-1953. (b) Statistics of Navy Medicine, Monthly Highlights of Trends and Facts. NavMed P-5028, 1949-1954.

[9] Dingle, J. H.: Common virus Infections of the Respiratory Tract, Diagnosis and Etiology. J.A.M.A. 136:1084-1088, 1949.

[10] Personnel of U. S. Naval Medical Research Unit No. 4, Naval Training Center, Great Lakes, Ill. The Use of Triethylene Glycol Vapor for Control of Acute Respiratory Diseases in Navy Recruits. Am. J. Hygiene 55:203-229, 1952.

[11] Personnel of U. S. Naval Medical Research Unit No. 4, Naval Training Center, Great Lakes, Ill. The Prophylaxis and Treatment of Acute Respiratory Diseases With Antihistaminic Drugs. J. Lab. and Clin. Med. 36:555-590, 1950.

[12] Seal, J. R.: Oral Penicillin Prophylaxis of Streptococcus Infections. 82nd Annual Meeting, A.P.H.A., Buffalo, N.Y., Oct., 1954 (To be published).

[13] Seal, J. R., Mogabgab, W. J., Friou, G. J., and Banta, J. E.: Penicillin Prophylaxis of Epidemic Streptococcal Infections. I. The Epidemic and Effects of Prophylaxis on the Clinical Manifestations of Acute Streptococcal and Non-Streptococcal Respiratory Infections. II. The Effects of Small and Large Doses of Oral Penicillin on Epidemic Streptococcal Infections and on Carriers of Group A Streptococci. J. Lab. and Clin. Med. 44:727-753, 831-859, 1954.

[14] Weber, R. W., and Seal, J. R.: Pneumonia in Navy Recruits. Etiology and Therapy. Research Project NM 005 051.10, Naval Medical Research Unit No. 4, Naval Training Center, Great Lakes, Ill. (To be published).

[15] Personnel of U. S. Naval Medical Research Unit No. 4, Naval Training Center, Great Lakes, Ill. The Prophylaxis of Acute Respiratory Infections with Oral Penicillin or Chlortetracycline. Antibiotics Annual 1953-1954, pp. 123-135, Medical Encyclopedia, Inc., New York, 1954.

[16] Gerber, P., Woolridge, R. L., Seal, J. R., and Ziegra, S. R.: Epidemic Influenza B and C in Navy Recruits During Winter of 1951-1952. Proc. Soc. Exp. Biol. and Med. 81:624-628, 1952.

[17] Haight, T. H., Kahn, F. H., and Ziegra, S. R.: Efficacy of Erythromycin in the Treatment of Acute Respiratory Infections. Armed Forces Med. J. V:1405-1422, 1954.

[18] Seal, J. R.: The Role of the Environment in the Transmission of Acute Respiratory Infections. Proceedings of VI International Congress of Microbiology, 1953, Rome, Italy.

[19] Meiklejohn, G., Kempe, C. H., Thalman, W. G., and Lennette, E. H.: Evaluation of Monovalent Influenza Vaccine. II. Observation During an Influenza A-prime Epidemic. Am. J. Hygiene 55:12-21, 1952.

[20] Hennessy, A. V., Minuse, E., Davenport, F. M., and Francis, T., Jr.: An Experience With Vaccination Against Influenza B in 1952 by Use of Monovalent Vaccine. Am. J. Hygiene 58:165, 1953.

[21] Philip, R. N., Bell, J. A., Davis, D. J., Beem, M. O., and Beigelman, P. M.: Epidemiological Studies on Influenza in Familial and General Population Groups. I. Preliminary Report on Studies with Adjuvant Vaccines. Am. J. Public Health 44:34-42, 1954.

[22] Jensen, K. E.: Strain Variations and Cross-Relationships in Influenza Virus. Am. J. Public Health 44:1167-1173, 1954.

[23] Gezon, H. M., Cook, J. S., Magoffin, R. L., and Miller, C. H.: The Use of Penicillin and Sulfadiazine as Prophylactic Agents Against Streptococcal and Non-specific Respiratory Infections Among Recruits at a Naval Training Center. Am. J. Hygiene 57:71-100, 1953.

[24] Wannamaker, L. W., Denny, F. W., Perry, W. D., Rammelkamp, C. H., Jr., Eckhardt, G. C., Houser, H. B., and Hahn, E. O.: The Effect of Penicillin Prophylaxis on Streptococcal Disease Rates and the Carrier State. New Eng. J. Med. 249:1-7, 1953.

[25] Bernstein, S. H., Feldman, H. A., Harper, O. F., Klingensmith, W. H., and Cantor, J. A.: Observations in Air Force Recruits of Streptococcal Diseases and Their Control with Orally Administered Penicillin. J. Lab. and Clin. Med. 44:1-13, 1954.

The U.S.S. *Bennington* Disaster*

Handling and Initial Treatment of Casualties

By

CAPTAIN JOHN L. ENYART, (MC) USN†

AT ABOUT 0630 on the morning of 26 May 1954, the U.S.S. *Bennington,* while conducting routine air operations in southern New England waters, sustained a serious explosion which involved the officers' wardroom and enlisted messing spaces on the second and third decks of the forward portion of the ship. Ninety-one persons were killed outright, 12 died later of injuries, and 203 were injured. Shortly after the explosion occurred, the commanding officer of the *Bennington* informed the commanding officer, Quonset Point, of the disaster and requested medical assistance. This report is an account of the handling and initial treatment of the casualties, and is presented as an object lesson for the management of possible disasters in the future.

THE DISASTER PLAN

The officer of the day at this hospital was informed by the operations officer at the Naval Air Station, Quonset Point, at 0740 on 26 May 1954 that an accident had occurred aboard the U.S.S. *Bennington,* and that 100 casualties, with 10 deaths, had been reported. The ship's position was given as 75 miles south of the Brenton Reef Lightship, and the expected arrival time at Quonset Point was 1230. The commanding officer was immediately informed and he gave instructions for the officer of the day to alert all chiefs of services and division heads for a conference to implement the hospital's disaster plan with such modifications as would be required to cope with the problem.

Additional information received raised the casualty figures to 250, and indicated that the majority of the patients would be burn casualties with some trauma. It was decided to evacuate patients from two surgical wards, one orthopedic ward, and one general medical ward in the main building of the hospital to the outlying pavilion wards. Postoperative surgical and the nonambulatory orthopedic patients were to be consolidated in the remaining orthopedic ward in the main hospital building. The evacuated wards, with a capacity of about 200 beds, were to be prepared immediately for the reception of the burn casualties. After this decision, it was planned to treat the burned patients by the open method with emphasis on electrolytic balance of body fluids and shock treatment. The details of the treatment were outlined and explained to the assembled medical officers, who were then divided into teams and assigned to the casualty wards.

Stocks of material required for treatment of casualties were reviewed and emergency supplies broken out for issue to the casualty wards. Immediate steps were taken to augment the supply of whole blood in the hospital's blood bank with blood from physically acceptable patient and staff donors. The chief of the nursing service made the necessary assignment of Nurse Corps personnel and arranged for procurement of nursing equipment and supplies. The personnel officer assigned additional personnel to the wards receiving casualties, the transportation section, and casualty receiving section, and made provision for first-aid parties to proceed to Quonset Point to accompany the casualties to this hospital. Measures were taken to control the flow of traffic within the hospital reservation, and public information release procedures were established.

TRANSPORTATION OF PATIENTS

For the most part, the steps taken coincided with the procedures outlined in the hospital's disaster plan. Certain modifications were made on the basis of information re-

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† Commanding Officer, U. S. Naval Hospital, Newport, R.I.

ceived concerning the type and manner of transportation of casualties. The original plan provided for the ship to proceed directly to its dock at Quonset Point and to arrive at about 1230. Small craft were to be dispatched by the naval base at Newport to be available for the transportation of casualties to Newport when the *Bennington* docked. A request was made by the commanding officer of the naval base at Newport for first-aid parties to accompany these craft, and assignments were made.

The suggestion was made for the ship to anchor in the channel opposite the hospital to permit the casualties to be evacuated by small boat to the hospital's boat landing. This would have resulted in a saving of about one hour and 40 minutes in arrival time at the hospital. Before the suggestion could be adopted, arrangements were made for the casualties to be airlifted by helicopter. Three landing points were designated at and near the hospital, to which ambulances were dispatched. The naval station made fire trucks available to stand by in the event of a landing casualty.

As the severity of the situation became apparent, it was obvious that additional personnel in all categories would be required. All available medical officers in the nearby forces afloat were ordered to report to the hospital for assignment. Enlisted personnel were sent from destroyer tenders and from the naval station. The initial radio reports brought telephone calls from civilian doctors, nurses, and other civilians from the nearby communities. Civilian practitioners from Newport Hospital reported and were assigned to casualty wards. Civilian nurses and nurses' aides were directed to the chief nurse, who made assignments. As the enlisted personnel reported aboard, they were screened for technical specialties and assigned to the various services where their training could be fully used.

The Plan in Operation

At 1045 the first helicopter landed on the hospital reservation with two patients. From that time until 1345, the helicopters shuttled back and forth, carrying patients, supplies, and personnel, while the ship was proceeding to port. An adequate communication system was improvised through the use of radio-equipped shore patrol vehicles at the helicopter landing sites and at the hospital entrance. Sixty-four patients were brought from the ship by helicopter, and later 18 more were transported by boat from Quonset Point, making a total of 82 patients admitted. It is estimated that the innovation of the helicopter evacuation resulted in saving the lives of at least 40 percent of the total casualties admitted. This type of transportation also permitted a staggered admission procedure which made possible the thorough screening of the patients and their assignment to an appropriate ward, depending on the type and severity of the injury. Because of its accessibility to the casualty wards, the front entrance of the hospital was substituted for the regularly designated triage station.

No attempt was made to procure admission data, other than to maintain a count of patients admitted, until the patients were placed in bed and treatment initiated. At that time, admission teams assigned to each ward completed the admission record, NavMed Form 1285, and the personnel office prepared a master casualty listing from data obtained. The Bureau of Naval Personnel directed this hospital to prepare daily progress reports for all casualties on the critically and seriously ill lists other than those whose next of kin came to this area.

Of the 82 casualties admitted, 16 were classified as critically ill and 25 as seriously ill. All patients were immediately placed under treatment upon admission to the casualty wards. Because the fleet and civilian physicians had not attended the staff conference outlining the method of treatment to be used, some minor difficulties were encountered at first. This situation was resolved and the treatment proceeded as originally planned.

The shock and burn treatment teams, each consisting of a doctor, a nurse, and two hospital corpsmen, continued to function as a unit throughout the first 24 hours following the admission of the patients. When the situation stabilized, duty sections consisting of

six medical officers, four nurses and 12 hospital corpsmen were established on eight-hour watches for each of the four wards. This routine continued in effect, with certain modifications, during the first 10 days. When the condition of the patients permitted, further screening was done to group the more serious cases in one ward and thus facilitate treatment and save personnel. The personnel requirements were gradually reduced until on 20 June routine duty assignments were re-established for all wards.

Problem of Supplies

Shortages of supplies soon began to occur, particularly of sterile goods, syringes, intravenous sets and stands, rubber gloves, rubber sheets, arm boards, blood pressure apparatus, stethoscopes, drinking tubes, and instruments. The property officer and his assistants circulated throughout the wards continually during this period and relayed requirements to the procurement section. The medical supply section of the Naval Supply Depot at Newport had been alerted, and promptly processed telephonic requisitions. Some equipment and supplies were obtained from surrounding medical activities, including civilian hospitals. Clothes trees and metal mosquito bars were improvised for use as intravenous stands. Frames were made from ½-inch metal rods to serve as cradles to keep bed clothing from burned areas on the patients.

The shortages previously noted were directly concerned with the initial phase of the problem. Because the hospital's otherwise adequate supply system was not sufficient to provide for an emergency of such magnitude, supplies of some required items were exhausted during the first day, a few during the first two or three hours. The availability of additional supplies from the depot proved of inestimable value. The open purchase of supplies required for treatment of burns and secondary infections was complicated by the long holiday weekend because most commercial medical supply houses were closed. Furthermore, the usual local sources were unable to furnish the required material in the quantities desired. This required telegraphic orders to the main supplier or manufacturer. The main items in this category consisted of parenteral antibiotics and débriding agents, both nonstandard items. The procurement of six Stryker frames, urgently needed for this type of casualty, was accomplished within 72 hours through telephonic order to the manufacturer and air-freight delivery. The co-operation shown by all commercial suppliers during this period was excellent.

The staffing and equipping of a completely functioning radioisotope laboratory within four days of the disaster, for use in determining blood volume and extra cellular fluid volume, and for other studies in connection with the treatment of these casualties, will be made a subject of a separate report. It is clear that the many logistic problems encountered were only surmounted through the exceptional hard work and the splendid co-operation of all personnel, commands, and civilian agencies.

Handling of Visitors

Because the influx of visiting relatives would create a problem, steps were taken to minimize it as much as possible. A reception room near the information desk was equipped with comfortable furniture and staffed by volunteer Red Cross Gray Ladies. Arrangements were made for two chaplains to be in constant attendance. General visiting on the casualty wards was not permitted. The immediate next of kin of patients on the seriously and critically ill lists were allowed brief visiting periods of from three to five minutes twice daily. Upon their first arrival at the hospital, relatives were met by a chaplain of their own faith. If visiting was permitted, the visitor was provided with a surgical gown and mask and accompanied to the ward by the chaplain. Where indicated or requested, an opportunity to consult with the medical officer in charge of the case was provided.

The Red Cross assisted the visitors in finding housing accommodations. Transportation was provided by the volunteer motor corps group. A section of the mess hall was assigned to those visitors who desired to pur-

chase meals at the hospital, and a small canteen was set up in the Red Cross building to provide refreshments for the relatives without charge. The local chapter of the Navy Relief Society made their services available to these families and rendered required financial assistance. This phase progressed without unpleasant incident and the command was pleased to receive many appreciative comments from departing visitors for the consideration that they had received.

During this emergency the hospital staff was augmented by 66 enlisted personnel from shore activities and forces afloat. Twenty-nine medical officers reported for emergency temporary additional duty from nearby ships and naval hospitals. The research programs which assisted in the treatment of the casualties were staffed by five medical officers and eight enlisted technicians from other naval hospitals.

At this writing, of the 82 patients admitted on 26 May, 31 remain on the sick list. Twelve of these are presently on sick leave and will be returned to duty upon their return. Of the 41 patients whose condition was classified as critical or serious, three are still being carried on the seriously ill list, and 12 died of injuries received. Thirty-nine patients made a complete recovery and have been returned to duty.

Conclusions

From the experience herein reported it is possible to list the chief conclusions which may be drawn from the *Bennington* disaster. An efficient organization and disaster plan must be flexible and adaptable to the existing environmental conditions. The following factors are considered essential in over-all disaster planning:

1. Availability and proper use of additional specially trained personnel from other activities.

2. Use of available auxiliary personnel (Red Cross, Gray Ladies, Navy Relief, Girl Scouts, convalescent patients, and civilian employees) for nonprofessional duties.

3. Intensified instruction of lower-rated hospital corps personnel in casualty handling procedure and periodic disaster plan drills.

4. Instruction in casualty handling and evacuation by helicopter.

5. Availability of mobile radio equipment for maintaining essential communications.

6. Liaison of security force with civilian authorities in establishing traffic control measures.

7. Adequate provisions for reception, housing, transportation, and other assistance for visiting next-of-kin, under direction of chaplains, Red Cross, and Navy Relief.

8. When possible, preliminary command conferences to outline the details of casualty reception, triage, treatment, and necessary modification of the disaster plan, to meet requirements of the situation.

9. Designation of staff medical officers and staff nurses in a strictly supervisory capacity of the casualty wards to correlate activities, prevent the issuance of conflicting orders, and assure proper use of nonstaff personnel.

10. Use of wards that are most convenient to Central Supply, operating room, laboratory, x-ray, and diet kitchens, rather than outlying wards that are remote from essential facilities.

11. Screening of requests for special drugs, equipment, research requirements, and personnel through the executive officer in order to eliminate duplication and excess procurement.

12. Standardization of blood collecting and blood donor sets.

13. Early conferences daily to outline the clinical progress of patients and necessary changes in treatment plans. The attendance of the personnel, finance, and pharmacy officers is advisable to correlate planning.

14. Immediate availability of reserve medical supplies and equipment. This is an essential factor in any emergency or disaster planning. The curtailment of supply levels at medical activities requires a more realistic approach to the requirements for insurance-type items, as related to the accessibility of reserve stocks and to transportation difficulties under emergency conditions.

It is believed that these points, tested in an actual emergency situation, will be of interest to all responsible for evolving and activating military or civilian disaster plans.

Retrograde Intramedullary Introduction of Multiple Kirschner Wires into the Ulna as a Method of Choice in Forearm Fractures or in Isolated Fractures of the Ulnar Shaft

By

LT. COL. MAX A. ZEHNDER, MC, USAR*

(With three illustrations)

AFTER the boom in intramedullary fixations in the early '40s only a few indications remained uncontested for a primary intramedullary pinning. Among those are the transverse fracture of the femur and the internal fixation for the forearm fracture. Although there is still a possibility of closed reduction and external cast fixation or traction alignment, there are definite and undisputed advantages in favor of the intramedullary fixation of femur and ulna. The recovery time gained for the femur fracture is the main factor in favor of the method. In forearm fractures of the shaft and in isolated ulnar shaft fractures there are considerable difficulties for a closed reduction due to rotatory function of the forearm in supination and pronation. The high incidence of delayed union and pseudarthrosis or fragment angulations in fractures of both bones and the occurrence of bridging callus calls for a primary ideal anatomical reduction with solid intramedullary support. In our experience even the plating of such fractures cannot prevent a pseudarthrosis of an ulna shaft fracture. Robertson in a recent survey of his experience with intramedullary nailing of the forearm points to the advantages of the procedure versus the plating which promotes the intramedullary fixation to a method of choice. He used Rush pins most satisfactorily, but explains that the operation is not easy and insists on the necessity for great care in selecting a fixation device suitable in length and maximal diameter for a snug fit in the medullary canal yet permitting easy separation and apposition of the fragments on the pin. One of the main difficulties even in intramedullary fixation is the prevention of the rotatory movement of the forearm at the fracture site. It is a handicap where the internal rod or pin acts as an axle, permitting siding and rotational movements at the fracture ends thus preventing the solid fixation necessary for an undisturbed callus formation.

During the past ten years we practiced the intramedullary fixation of the ulna using multiple Kirschner wires in a routine procedure with very gratifying results as to fixation and anatomical and functional restoration. During this tour of duty we had occasion to treat six patients by this method with satisfactory results (with one exception in a case of chronic antibiotic resistant osteomyelitis after a compound ulnar fracture resulting in an undue delay of bony union). In our very first case, using a single Kirschner wire we still were deceived by a delayed union, most probably due to the rotatory movement. The same may apply to any other round pin which cannot fit snugly into the medullary canal of different diameter at different levels. Other authors replaced the single round pin by a diamond or square sized diameter comparable to the cross section of a Hansen-Street nail for the femur in order to eliminate rotation over the pin.

Using multiple wires for the intramedullary fixation we had most satisfactory results and at the same time we avoided any difficulty in the choice of the size or shape of a pin. With multiple wires (usually three

* Surgical Dep't., Hartford Hospital, Hartford, Conn.

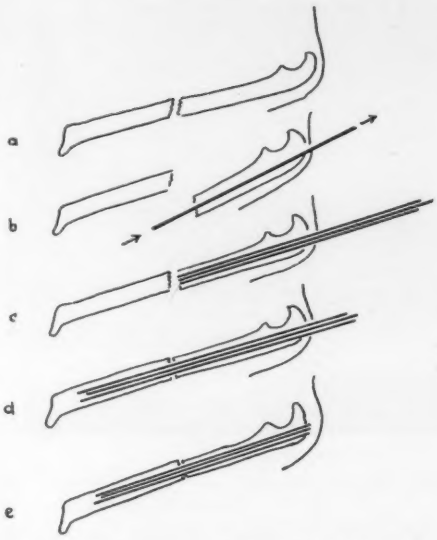

FIG. 1. Retrograde introduction of Kirschner wires into the fractured ulna.

a. Diaphyseal fracture in midshaft.
b. Proximal fracture end protracted into the wound and first wire introduced through the olecranon.
c. Three wires introduced, leveled at the site of the fracture.
d. Retrograde introduction of the wires into the distal medullary canal.
e. Wires cut snugly over the olecranon.

to five) we still enjoyed the ease of introducing a round and smooth supporting metallic axis into the fractured bone and were able to eliminate the rotatory stress at the fracture site. The flexible steel wires present enough elasticity to adapt to the medullary cavity. The slight elastic tension of the different wires reinforced by their mutual support and pressure against the cortical enclosure enhances an internal stability within the medullary canal. Furthermore their separate perforation through the olecranon (each wire is drilled separately through the proximal end of the ulna) assures sufficient resistance against any rotatory stress. The ease of introduction and removal of the wires, each handled separately, as well as the elimination of the selection of diameter cross-sections and lengths of the pins favored our choice of this method in handling forearm fractures.

PROCEDURE

In direct and compound fractures of the shaft of the ulna the wires are introduced through the original traumatic wound after its debridement.

In closed fractures of the ulna a longitudinal incision of one half to one inch length is carried out over the edge of the ulna over the palpated fracture site. A bone hook protracts and angulates the proximal fracture surface into the wound. The Kirschner wires of standard size and strength are introduced into the proximal medullary cavity using as many as needed to fill the canal. Each one is introduced separately and drilled proximally through the olecranon and the skin at the elbow. All the wires are leveled snugly at their distal end with the fracture level of the proximal bone fragment. The introduction of the wires is easily performed with a hand drill or preferably with an electric drill handle. Then the fracture is approximated and aligned, if necessary it is held firmly in place with a bone clamp or a cotton strip slung over both fragments. Where oblique or flat surfaces of the fractured planes are present both ends of the fractures are slightly slit with a fine chisel around the cortical circumference. This enhances strong mutual indentment of both fracture surfaces in their approximation and further prevents rotation or sliding of the fracture surfaces. The wire drill handle is now inserted on the protruding wires over the olecranon and the retrograde insertion is performed into the medullary canal of the distal fragment. When all the wires are reinserted within the distal ulnar marrow canal a firm central stabilization of the fracture is obtained. The protruding wires are clipped off snugly at the surface of the olecranon by aid of a suitable wire cutter. Care is taken to compress the skin over the olecranon while cutting the wires, in order

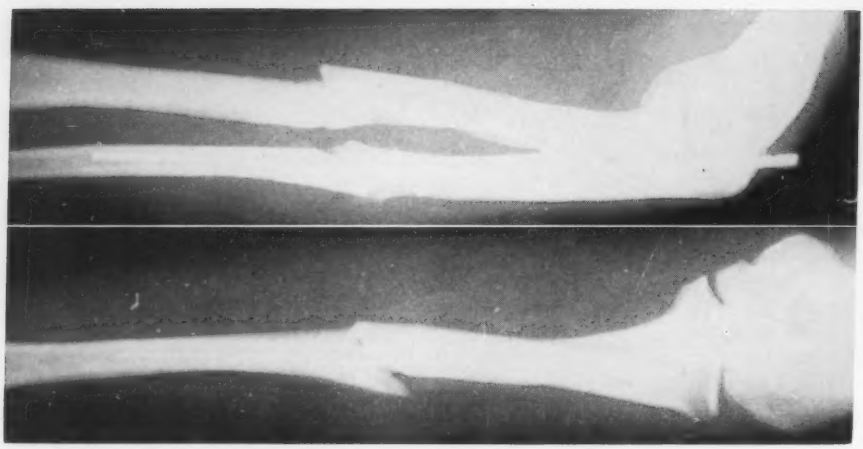

FIG. 2. Three intramedullary wires introduced.
X-ray: 6th week after intramedullary fixation.

to exclude any long protruding wire ends. The elastic skin rebounds over the wire stumps very easily and prevents infection from the skin surface. Removal of the wires is carried out at the time when complete ossification of the callus is visualized by X-Ray. The wires are well tolerated and can be left in place even after removal of an eventually applied cast. Removal is easy and usually not painful. A small incision of the skin 1 cm. in length over the olecranon (done under a few ccm of a local anesthetic) uncovers the wire ends. The wires are grasped with a flat plier and extracted in a solid continuous pull, all together or each one at a time. In sensitive and apprehensive patients the extraction is performed in a few minutes under a small dose of a short acting intravenous anesthetic.

ANESTHESIA FOR THE INTRODUCTION OF THE WIRES

Although in a few cases in males we were able to perform the internal wire fixation under local anesthesia (injection at the fracture site for the small skin incision as well as into the skin over the olecranon and small amounts into the medullary canal), a short acting intravenous general anesthetic is most convenient since most patients are apprehensive about drilling and wiring around their elbows. With an electrical drill the whole procedure does not require more than ten to fifteen minutes.

INDICATIONS

The rather rare *isolated fracture* of the shaft of the *radius* usually does not present difficulties for closed reduction and the intact ulna serves as a splinting support. An external cast fixation is sufficient to insure solid union. Only in exceptional cases operative reduction and fixation might be necessary and is best performed with a small Rush pin introduced dorsally near the styloid process of the distal end of the radius.

Isolated ulnar fractures within the shaft region as well as fractures of both bones of the forearm present the main indication for the operative procedure of intramedullary fixation of the ulna because of the difficulties already outlined. No other method can replace the internal fixation in its stability for maintaining union and alignment in two level shaft fractures. Most often the shaft fractures of the ulna derive from direct traumatic influence and are compound fractures (side-swipe fractures). There the debridement of the wound is most easily combined with the introduction of the

FIG. 3. Same case: elbow.

intramedullary wires.

In fractures of both bones deviation or angulation of one of the fractures during the attempt of alignment of the other are well known and add to the difficulties for an anatomically satisfactory closed reduction. Even after cast fixation unpleasant surprises occur especially in oblique fractures with sliding surfaces. When the original fracture hematoma dissipates the gained free space within the cast may give way to the rotatory influence of the muscles.

In the past we never had to resort to an open fixation of both bones. Fixing the fractured ulna (easily and readily accessible) with an intramedullary wire support we actually transformed the complete forearm fracture into an isolated shaft fracture of the radius. Under extension of the forearm by traction at the hand and the wrist the alignment of the axis of the radius was easier to perform with an already stable ulna with intramedullary support. With rolled cotton pads placed alongside the interosseous interspaces on the flexor as well as on the extensor side of the forearm it is possible to maintain the parallel alignment of both bones within a circular cast.

It is strictly necessary to add a supporting cast in cases of fractures of both bones of the forearm when only the ulna underwent intramedullary nailing. On the other hand we were able to proceed with the intramedullary wiring alone in isolated fractures of the ulna. We remember a case of a compound fracture of the ulna where the ulnar wires were introduced during the debridement of the traumatic wound. No cast was ever applied and the patient was able to move his arm freely at the wrist and the elbow after three days. There was only minimal discomfort and only minimal limitation of maximal flexion, due to the stretched skin at the site of the wire stumps over the olecranon. Consolidation of the fracture occurred between the fourth and fifth week after the injury.

SUMMARY

The retrograde intramedullary introduction of multiple Kirschner wires into the ulna (introduced at the fracture site through the proximal fragment and returned by retrograde insertion into the distal intramedullary canal) is recommended as the method of choice for the fixation and stabilization of fractures of both bones of the forearm and for isolated ulna fractures. The ease in performing the procedure without selecting pins and nails of specific size, shape or length makes it an ideal method performed in a short time and with simple tools, available in every operating room. The multiple wires give sufficient strength and support even against rotatory stress.

REFERENCES

Rush, L. V. and Rush, H. L. Technique for longitudinal pin fixation of certain fractures of ulna and of femur. J. Bone and Joint Surg. 21:619, 1939.

Rush, L. V. and Rush, H. L. Reconstruction operation for comminuted fractures of upper third of ulna. Am. J. Surg. 38:332, 1937.

Street, D. M., Hansen, H. C. and Brewer, B. J. Medullary nail, presentation of new type and report of case. Arch. Surg. 55:423, 1947.

Kuntscher, G. Die Marknagelung von Knochenbrüchen. Arch. Klin. Chir. 200:443, 1940.

Robertson, Robert C. Intramedullary fixation of fractures of the forearm. Am. J. Surg. 85:496, 1953.

Rehabilitation in Neurosurgical Nursing*

By

LIEUTENANT VERA E. THOMPSON, NC, USN**

Neurosurgical Nursing is a fertile planning area. In the acute phase, advance teaching and preparation sets the group in motion to handle emergencies calmly and expeditiously. In the chronic phase, the same teaching and preparation, now geared to helping the patient help himself is carried out. The keyword in neurosurgical nursing is "eternal vigilance" and knowing what *to do and* when *to do it to direct these patients toward the goal of maximum function and the highest possible degree of self-dependence.*

THE field of neurosurgical nursing places an inestimable value on the word "rehabilitation" which, more or less, has direct bearing on every patient from the acute to the chronic phase. Rehabilitation may be considered to be the restoration of a patient and bringing him back to some ability toward normal functioning in daily living. Convalescence all too frequently in neurosurgical patients extends for a prolonged period and it is imperative that the nursing team provide these patients with the necessary therapeutic measures in order that they may be restored to the maximum.

Planning is a team project done on a day to day basis by the doctors, nurses, nonprofessional workers, and the patients themselves. The needs of the department must be assessed and "quality" care is a goal all hands strive to attain.

We all recognize the skills the neurosurgeon possesses in his tedious, long, wearisome hours in surgery and the tense moments which follow long after the patient returns to his bed—but the neurosurgeon also recognizes that rehabilitation begins at this point. What he has done in the operating room, the nurse must now be prepared to carry on at the bedside and in her he vests the faith that she is capable of assuming this responsibility. In this acute stage, the nurse is ever watchful of the vital signs, symptoms of intracranial hypertension, bladder and bowel care, electrolyte balance, tube feedings, posturing and positioning, and complete personal hygiene of the patient. Rehabilitation, as you see, begins at once. As the convalescence progresses, it is the nurse's responsibility to provide the patient with the opportunity to become as self-sufficient as possible but, in order to do this, she must completely understand the nature and etiology of the disease.

She must be prepared to instruct all workers in the department why patients must be encouraged to do for themselves. Usually we are too eager to assist and rush to the side of the patient saying, "Let me help" or "I'll do that for you." This reaction, while well meant, only creates a greater feeling of helplessness in the patient who we are striving to teach to be independent. A patient has more fear of not being able to do things rather than not wanting to do them.

Neurosurgical nursing is a fertile planning area. In the acute phase, advance teaching and preparation sets the group in motion to handle emergencies calmly and expeditiously. In the chronic phase, the same teaching and preparation, geared now to helping the patient help himself is carried out, but the following must first be established.

1. The present psychosocial, physical and vocational status. What is the patient's ability to learn and how will he respond to training?

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** Head of the Standards and Training Section, Professional Branch, Nursing Division, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D.C.

2. The understanding of the actual lesion present and its prognosis.

3. The patient's over-all general level of health. There are three cardinal objectives: First, educating the patient in self-care; Second, helping him to ambulate, if possible; Third, helping him to make a social readjustment. We want to preserve his self-independence but he needs to have the motivation and will power in order to be rehabilitated.

Throughout all these objectives, emotional regression is a big problem. Everyone has inherent psychological weaknesses. Some patients cannot, without help, compensate for their disability. Teach a patient how he can more effectively use what he has left, not going beyond his actual physical limitations.

Dr. George Deaver from the Institute of Rehabilitation, Bellevue Medical Center, New York, believes that education takes place on the philogenetic level—movements which are learned first return first. This is an organized method of learning beginning with the movements man first learned and were considered to be primitive movements: e.g., A baby moves his arms long before he learns to use his wrist and his fingers in the finer movements of coordination. This pattern provides the patient with an opportunity to see improvement as he learns to do the simple movements followed in time by the more complex ones. Thus, emotional trauma is far less this way than it would be if he were encouraged to do exercises beyond his present capabilities. It must further be remembered that a patient may revert to a childhood level and demonstrate the behavior pattern of a child. The extent of the trauma or the disease will often determine the period of time such a patient is afflicted in this manner. Since in brain cases there is frequently some mental deficit, we must not forget to take this into consideration in our teaching program. Know what stage the patient is in and begin rehabilitation there. We may have done no more than to put him in a state of "readiness," but this is a big stepping stone in his progress for the future.

Unless contraindicated, *all helpless patients are turned every two hours. The staff personnel on the neurosurgical ward should be so well indoctrinated in this regime that it becomes a part of them.* Alleviation of pressure areas, in the constant endeavor toward prevention of decubiti, is indicated for patients who cannot move themselves. I am reminded of one patient in particular, who had extensive brain damage following a motorcycle accident. He was on the ward in a comatose condition for a period of 17 months and during this time his skin remained intact and pressure areas did not develop. Emphasis was directed toward this hard and fast rule of turning the patient every two hours. Naturally, turning alone will not prevent decubiti. All the other facets are tied in with it such as: high protein feedings, hydrotherapy, good skin hygiene, etc.

In this connection, in 1952 at the U. S. Naval Hospital, Oakland, California, with the large number of paraplegic and quadriplegic patients, as well as those with head injuries from the Korean theater and from stateside accidents, it became necessary to provide an improved means of bathing and giving daily care to these patients. Ordinarily, a heavy staffing pattern of nurses and corpsmen was required to accomplish the best possible care, however, a wider and more equitable distribution of personnel was realized with the development of the "flow tub method" for providing daily bed baths. A room on the ward was utilized and a flow tub, which was available from another service, was installed by the maintenance department. Several canvas slings were made in the upholstery section. The ward corpsmen were given instruction in functioning as a team when assigned to the tub room and they were taught how to operate the flow tub, how to lift the patients from the stretcher to the sling, and how to give the patient complete care, including oral hygiene. All patients were

given daily baths by the "flow tub method." Not only did the spinal cord cases enjoy these daily baths, but the tub had its merit for use with those sometimes restless and irritable long-term cranial injuries. We were well pleased with the results. The patients, on the whole, received better care and had the additional benefit of hydrotherapy on the ward as well as their daily Hubbard tank treatments in physiotherapy. There was excellent carry over for them since muscles became less spastic and relaxation was easier. The favorable comments made by the patients proved its worth in rehabilitating them. Morale was improved. The staff had a less tedious day because of this innovation. All baths could be given in a couple of hours with one team of workers in the tub room and another team on the ward, preparing the unit.

Decubiti, if present, were seen to heal with marked rapidity when these patients were bathed in the flow tub. All decubiti dressings were removed and the open areas exposed to the regulated water temperature which facilitated granulation. The comatose patients, if past the acute stage, with levine tubes and catheters clamped were subjected to tubbing also. Often these patients, in the chronic phase, have developed a decerebrate rigidity and are extremely spastic. The spasticity may be so pronounced that a bed bath is difficult to administer. In the flow tub, the muscles relax.

Bladder and bowel rehabilitation cannot be overlooked. Since this is such an extensive field to cover and because a time factor is involved, I will only mention that this too, is rehabilitation. Training the patient to maintain a schedule and learn new habit patterns in caring for these personal needs is one of the biggest steps in his progress which he can make. Not all patients can acquire new habit patterns and not all have the physical capacity whereby it can be developed, but for those who can be helped no effort should be lost in teaching them.

The next step in the rehabilitation program is that of teaching bed patients exercises just as soon as they are physically ready to do them. Inactivity will early produce a breakdown of body substance with more protein going out of the body than is being assimilated. A negative calcium balance can also develop which affects the bones by demineralizing them and also leads to formation of kidney stones and bladder dysfunction. Two disabilities can occur: limitation of range of motion and dysfunction of muscles. Posturing and positioning are of prime importance. The bed patients should be taught to move about in bed and, if paralyzed, how to handle that part of their body. They need to learn balance and how to hold themselves erect in a sitting position. Push-ups are an important exercise to prepare a patient for the day he will ambulate by the use of crutches. The triceps and shoulder depressor muscles in his arms must be strengthened to eventually carry the weight of his body. Deformities or further disabilities can be prevented by instituting simple nursing care methods. Contractures only retard a patient's progress. A paralyzed arm is like the proverbial "fifth wheel on a wagon" to a patient since he has to carry it with him but has no use from it. He should be instructed to keep the affected arm always at the same level as the good one. If eating or writing, the weak hand should always be on the table or desk. Keeping it in an accustomed position for use makes it less noticeable as a paralyzed member and aids in giving self-confidence to the patient as well as providing exercise for the weakened muscles. Brightly colored scarves which match the clothing may be used as slings and also serve as a good morale factor.

A further step in the rehabilitation of the patient of equal import but one which presents a great challenge and taxes the ingenuity is that of speech therapy. The nurse does not need to be a speech therapist to assist the aphasic patient. She should set aside a period in the day when she is not under pressure and has ample time to sit down with the aphasic patient, talk with

him, and explain some of the ways in which she intends to help him. He cannot be pushed too far at any one time. These patients suffer great emotional trauma due to their inability to communicate and will begin to cry at the slightest provocation. Gestures, known as the manual language, and head shaking are discouraged. Questions which require an answer should be directed to the patient, e.g., Do you want orange juice or tomato juice? This forces him to attempt an answer rather than shaking his head in an affirmative or negative response to the question requiring only yes or no. He can be provided with cards made with pictures of common everyday things he uses and needs and, with guidance, attempt to name the object on the card. Practice in trying to pronounce the name of the object he sees, assists him in learning to eventually say the word and make himself understood.

The rehabilitation of the neurosurgical patient may also be complicated by visual impairment. Special eye care should be given in accordance with the physician's orders. This is further implemented by: 1. Attention to the arrangement of his bedside table making the items he uses more accessible; 2. Mealtime can be made more enjoyable for him if he is told the food on his plate is placed there in relation to the numerals on a clock face. In his mind, he visualizes the meat at 6 o'clock and the vegetables at 9 and 12 o'clock.

To supplement the foregoing with respect to developing the patient's independence and self-reliance, there has been devised certain "gadgets" which are defined as those aids which the disabled person can use to make his activities for daily living easier. Many such aids can be made by the occupational therapy department and require planning with the patient plus the ingenuity of the nurse or other individuals concerned with his care. A simple leather or metal cuff to which a spoon handle can be attached will oftentimes fit around a hand which has lost its grasp, providing the patient with the aid he needs to feed himself. This may be modified and used for many other activities, e.g., writing, by insertion of a pencil, brushing the teeth, by inserting the toothbrush, or smoking, by inserting the cigarette. Bath aids can also be made: such as a mitten formed out of two washcloths sewn together, or a small bag containing soap to hang around the neck for use in the shower, as well as a long handled brush to facilitate back washing. Reaching tongs made of wood or metal assist the patient in picking up fallen objects otherwise out of his reach. A comb can be attached to an L shaped handle and used for combing the hair of a patient who has difficulty raising his arms to that level. Special reading stands can be made to adapt to the bed patient's needs. The gadgets which can be developed are countless in number.

In closing, I would like to re-emphasize the more salient aspects in the rehabilitation of neurosurgical patients. A continual evaluation of the needs of the patients is necessary and adaptations are made accordingly. We must be as realistic as possible. Situations are made for us but we can operate effectively within them if we work as a unit, not forgetting to include the patient who is keyman on the neurosurgical nursing team. Ideas and suggestions by all team members are analyzed for their merits and are tried if they appear sound and practical. The flow tub was the product of such thinking and planning. A commander, in the Medical Corps of the Navy (and a neurosurgeon) always said that the keyword in neurosurgical nursing is "eternal vigilance." To this I would like to add these words: "and knowing *what* to do and *when* to do it" in order to direct these patients toward the goal of maximum function and, if possible, the highest degree of self-dependence.

EDITORIAL

The Hoover Report

THE Hoover Commission made its report on the medical activities of the government on February 28. That report will be the subject of much discussion for months to come as there is much to be said for and against the recommendations. It is only fair to state that the commission made all its recommendations after long study and on the basis of economy. Certainly there is a need for that.

One recommendation made by this committee was that twelve of the sixteen Public Health Service hospitals should be closed, leaving four: two for narcotic and mental cases, the leprosarium at Carville, Louisiana, and a hospital for tuberculosis cases. It should be noted that a number of these sixteen hospitals are caring for merchant seamen, and that this care was prescribed by law many years ago because of the insufficient medical care provided for these men at port cities.

Another recommendation would limit the medical service to the veteran for non-service connected disability. This has been a controversial subject for some years.

The closing of some service hospitals along with certain Veterans Administration hospitals was recommended.

One of the surprising recommendations was that of placing the Armed Forces Medical Library under the Smithsonian Institute. Just where the library building would be located is not mentioned. The present site is adjacent to the Smithsonian Institute. This building is old, and while probably serviceable for some activity, since it is of permanent construction, it is certainly not suitable for the housing of such a valuable collection of books which have been accumulating since the Army started the library many years ago. A new building, somewhere, is urgently needed. The collection of rare medical books should be protected in subterranean vaults, properly controlled as to humidity and temperature and away from the potentional destruction of atomic and hydrogen bombs. There has already been too long a delay in providing such security.

Care for dependents of service personnel is probably the most knotty problem confronting the services. There appears to be no difference of opinion as to the need for such care, but the manner in which it shall be provided is one on which there is, as yet, no meeting of the minds. Fortunate is he who can live on a military post where the problem is solved for him by the commanding officer. Others who should be just as eligible for such care are not always recipients of that care.

They propose a regionalization of military medical services with one predominant service being responsible for each region. Such regional arrangement would result in a more efficient use of facilities and manpower, in the opinion of the Commission.

The first priority in the future reorganization of the Federal medical services is given by the Commission to the establishment of a Federal Health Council. As the Number One recommendation it urges that an Advisory Council, appointed by the President, should end the "chaos" characterizing the present status of Federal medical services.

It has taken several years for the Hoover Commission to study the situation and to make the recommendations. It will take more years to hear both sides of the issues and act upon these matters.

Around the World

By
CLAUDIUS F. MAYER, M.D.

JAPANESE medicine has been celebrating its postwar revival at the 14th session of its national *medical congress* held in Kyoto from April 1-5. While the city was priding itself on its richest Spring dress of blossoming cherry trees and azalea bushes, doctors of many regional medical and special societies were displaying the acquisitions of their art and science. Domestic and foreign visitors of the congress especially enjoyed the colorful exhibit on the history of medicine arranged in the National Museum at Kyoto.

For eleven centuries this ancient town near Lake Biwa had been the capital of the Japanese empire ("Kyoto" means "capital"); it used to be also called "the city of peace." Being an inland town Kyoto is probably free of the attacks of *Yokohama asthma,* the respiratory difficulty that is also observed at places other than the Yokohama area. According to the latest views of American authorities, a harbor usually surrounded by low hills, sundry manufacturing facilities, and heavy smog during the winter months are the parents of this type of asthma in certain Japanese portal towns. One wonders whether our own domestic smog (see later) will result in such troublesome sequelae.

At a meeting of the Yokohama Medical Association one of the lecturers discussed *neurosis in Japan,* and compared the psychiatric theories of various countries. In Japan the problem of neurosis is not as great as, for instance, in America (in the belief of the Japanese doctors) though a good many neurotics can be seen at the clinics in Nippon. It seems that major air raids did not increase the number of neurotics among the natives of the Far East; yet, at the beginning of the Sino-Japanese War in 1941, it was not infrequent to see people of the yellow races with various manifestations of hysteria (tremor, astasia-abasia).

Among Koreans, *intestinal parasitosis* causes many strange symptoms that are puzzling the western doctors who go there for a visit. Some of these symptoms are caused by the accidental ingestion of the mature filariform larvae of Ankylostomum duodenale in water or in food. The resulting intestinal colic is the "chedda" or "vegetable poisoning."

The Korean War is now almost forgotten, and its postwar period was officially terminated in the U.S. on January 31, 1955. There are still being published medical reports that describe *experiences of U.S. doctors* in the Korean War. Several physicians, who were held in prisoner-of-war camps during 1950-52, recently reported on the sufferings of U.S. *soldiers in communist captivity.* Pneumonia and dysentery were common among them. Their diet was low in quantity and quality, and their health was not properly taken care of. Drugs such as penicillin and sulfonamides were rarely seen. Those who died, perished mostly of malnutrition, exposure and harassment.

In these camps one could easily observe the *level of Chinese military medicine.* The Chinese doctors arrived at the POW camps late in 1951. They were mostly incompetent, with hardly more than a 6-month formal training. Their treatment was directed at symptoms only. They often applied remedies that were unusual or unknown to western medical practice, e.g., acupuncture for pain, injection of salt solution under the conjunctiva for glaucoma, pig-bile or implantation of chicken liver under the skin in vitamin deficiency, etc.

The memory of communist POW camps reminds us of the camps maintained for the United Nations by U.S. means, especially the one on *Koje Island.* Whatever happened to the clothing, equipment, and *military material* left on the island? After Operations Little Switch (April '53), Big Switch (July

'53), and Reclaim (Jan. '54) the island became silent. A year ago in March, another action started:—*Operation Phaseout.* In this action more than 450 long tons of clothing and salvageable equipment were sent to the Quartermaster's salvage center in Masan. There the PW clothing was reprocessed and sold to Korean civilian bidders for more than a million dollars. The tremendous amounts of scrap iron, scrap lumber and wire was also sold there. Infantry surplus equipment, in a total of 1,200 long tons, was sent to the Army's Pusan supply depot. Most of the more than 1,900 structures (concrete-covered mud huts) built on Koje were left there. The coal, firewood and a huge amount of engineer equipment were sold on the spot. The immense salvage operation saved about 7,000 long tons, or a value of about three million dollars. The barbed wire is non-salvageable, and it remains. It will stand as a reminder of a once turbulent era of this quiet island.

Among the *international meetings* of this year's spring season several will be long remembered, as the International Symposium on Cardiovascular Surgery (Detroit, March 17-18), the Latin American Electroencephalographic and Neurosurgical Conferences (Montevideo, March 21-24), and the World Congress on Prevention of Occupational Accidents (Rome, April 2-6). The *language of presentations* on the international meetings will remain a vexing problem for some time to come since our modern technology of communication is still far away from the day when a machine would automatically provide polyglot translations at its various outlets as the English words of the lecturer would pass into the microphone receptor. Until then?

Perhaps the believers in *Interlingua* will sometime succeed, and this new tool will become the international bridge between the many towers of Babel. Our most respectable medical journals are now beginning to publish summaries in this new language. There is now an Interlingua-English Dictionary ($5.00), with 27,000 terms, and an Interlingua Grammar ($3.50), and two general-science journals are published in Interlingua (Scientia international, and Spectroscopia molecular). That language was considered by one of its American promoters one of the top science events in 1954. An advertisement is enticing: "It is hard to make mistakes in Interlingua." *Quod erat demonstrandum!* All artificial languages have passed away:—the volapük of Schleyer (1879), the esperanto of Zamenhof (1887), etc. Will this be the fate for Interlingua?

Readers of English medical journals must have noticed by this time that the term *"Colonial Service"* is no more. The Government of Great Britain changed the name and nature of the service to *"Her Majesty's Overseas Civil Service."* Since Oct. 1, 1954, this new, and more flexible service assures medical officers that they remain eligible for employment in any post of the United Kingdom. Openings are in all parts of the world, but most of them are in Africa. Another recent change in old institutional terms occurred in West Germany where the "Wehrmacht" will be known henceforward as *"Streitkräfte"* (Armed Forces), composed of *"Land-, See- und Luft-Streitkräfte,"* formerly known as "Heer, Kriegsmarine," and "Luftwaffe."

The world lost a number of eminent doctors and scholars. The Swiss Auguste *Rollier* (1874-Oct. 30, 1954) was a pioneer in heliotherapy of tuberculosis which he practiced in his Leysin sanatorium (built in 1903). Italy mourns Pietro *Perona* (1891-Aug. 25, 1954), radiologist and tuberculosis specialist. France buried Antonin *Clerc* (1871-1954), cardiologist and hematologist and Jean-André *Labat* (1877-1954), professor of pharmacy, known for his work on defense against chemical warfare during World War I. Brazil's surgeons lost Mazzini *Bueno* (1889-1954), noted chest surgeon. Many of us appreciated the work of C. H. *Hampshire* (1885-Jan. 25, 1955), English pharmacist and creator of Pharmacopoea Internationalis. Some of us were close to the research of Sir Edward *Mellanby* (1884-Jan. 30, 1955), nutrition expert and former

Secretary of the Medical Research Council (shortly: MEDRESCO) of Great Britain. He gave a general warning about chemical manipulation of food, and described the bad effects of agenized flour. Owing to his efforts the use of agene in British flour will be discontinued at the end of 1955.

A brand new *experiment in cancer education* is carried out in Hull, England. Anyone who cares in this city may have a record played to him over the city's telephone system. This *Phonodiary* briefly explains to the caller the main symptoms any of which should send him hurriedly to his physician for a physical check-up. This sounds to be a rather dangerous play on the nerves.

In England it is still a practice that jewellers themselves pierce a woman's ear-lobe to enable her to *wear earrings*. Last October, when a lady customer tried to collect monetary compensation from the businessman because her ear had become infected in the operation, the judge of an English County court decided against the plaintiff: "The standard of care required by the law of a jeweller cannot be the same as that expected of a qualified surgeon—" ruled His Honor.

The Los Angelenos must always "coexist" with smog. But how much smog can they endure? There are now 17 different research groups in that city who are trying to find the answer. In Los Angeles alone, automobile exhausts puff more than 280 tons of carbon monoxide gas into the air daily. This, together with other combustion products of gasoline, is smog-forming. *Poison smog* is hard to control or to fight, especially if there are politics and pressure involved. In an American book (C. A. Mills: On Air Pollution, Bost., 1954) there is an account of the activities of Abe, restaurant owner and farmer who engaged in a one-man campaign for clean air and green grass. Abe's crop was ruined several times by sulfur fumes. Abe proposed to bring in new livestock into a polluted inhabited area in an endeavour to study the effect of smog on their health. But he was informed that if he did "he would be prosecuted for such an act as one of wanton cruelty to animals." . . . *Multa paucis!*

In response to a letter of congratulations from the Secretary, Association of Military Surgeons, the Surgeon General of the Navy replied:

"This will acknowledge the receipt of your letter of January 28, 1955, extending congratulations on my appointment as Surgeon General on behalf of the Association of Military Surgeons, and offering the use of the columns of Military Medicine.

"I appreciate your letter very much as to know that I have the good wishes of the Association is a great comfort and satisfaction to me.

"Would you be good enough to convey my thanks to the members of the Association?"

Sincerely

/s/ B. W. Hogan

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ASSOCIATION NOTES

Timely items of general interest are accepted for these columns. Deadline is 3d of month preceding month of issue.

Department of Defense

Ass't Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

LAGGING TRAINING OF RESERVISTS

Stronger laws are needed on the training of reserve forces according to the Department of Defense. Recent statements made to Congress are to the effect that only a small part of the reservists are engaged in paid training.

Laws to compel attendance at reserve training meetings are recommended, thus making a Ready Reserve more qualified to carry out its mission in time of emergency.

MILITARY MEDICAL ACADEMY PROPOSED

A bill has been introduced in Congress to provide $25,000,000 for the establishment of a Federal Armed Forces Medical Academy.

The academy would "train selected persons for service as doctors with the Armed Forces."

The number of cadets would be limited to 600 at any one time; a four-year course would be given, with particular emphasis on the military and civil defense aspect of medicine. Graduates of the academy would be required to serve five years active duty, and thereafter to remain in the reserve.

It is pointed out that the amount of money appropriated is for the establishment of the academy. To this amount, of course, would have to be added yearly appropriations for the operation and maintenance, not an inconsiderable amount as any medical school dean can attest to from his experience.

STRENGTH OF ARMED FORCES

The Department of Defense has released the figure of 3,172,870 as being the strength of the Armed Forces on December 31, 1954; this figure representing a decrease of 59,154 from November 30, 1954. Army strength was estimated at 1,315,600; Navy at 686,683; Air Force 949,970 and Marine Corps 220,617.

DOCTOR RATIO PER TROOPS

The present ratios of doctors in the various branches of the Armed Forces are as follows: 3.0 per 1000 troops in the Army; 3.26 in the Navy; and 2.9 in the Air Force.

These figures were recently cited by Secretary of Navy, Charles S. Thomas, in Congressional hearings on medical care for dependents of the Armed Forces personnel.

Army

Surgeon General—MAJ. GEN. GEORGE E. ARMSTRONG

Deputy Surg. Gen.—MAJ. GEN. SILAS B. HAYS

GENERAL ARMSTRONG TO NY UNIVERSITY

Major General George E. Armstrong, Surgeon General of the Army, whose tour of duty in that capacity will expire June 1, has been named vice chancellor for medical affairs at New York University. His appointment as chief administrative officer of the New York-Bellevue Medical Center is effective in July.

U. S. Army Photo

MAJ. GEN. GEORGE E. ARMSTRONG,
SURGEON GENERAL, U. S. ARMY

General Armstrong is a native of Indiana. He graduated from the Indiana University School of Medicine in 1925, and has served continuously with the Army since graduation. He interned at Letterman Army Hospital and was commissioned in the Regular Army Medical Corps in 1926. He has a distinguished service with the Army, starting as an honor graduate of the Army Medical School, Washington, D.C. and the Medical Field Service School which was at Carlisle, Pa. He worked in the field of surgery in the early part of his army career.

In World War II he was assistant theater surgeon of the China-Burma-India theater (1943-1944), and for two years was surgeon of the China theater. In 1946 he became chief of the personnel division of the Surgeon General's Office, and in 1947 was appointed Deputy Surgeon General. In 1951 General Armstrong became Surgeon General of the Army with the permanent rank of major general.

General Armstrong is the holder of the Legion of Merit, Army Commendation Ribbon, World War I Victory Medal, World War II Victory Medal, American Defense Service Medal, Asiatic-Pacific Campaign Medal with three Bronze Stars, Korean Service Medal, Chinese Honorary Nobility Medal, Chinese Cloud and Banner, Chinese Legion of Honor, Order of the Crown of Italy (Commandership), Italian Order of Saints Maurice and Lazarus (Commandership), Korean Order of Military Merit TAEGUK, French Médaille d'Honneur du Service de Santé Militaire d'Or.

He is a fellow of the American Medical Association, the American College of Physicians, and the American College of Surgeons; and honorary member of the American Foundation for Tropical Medicine, the Washington Academy of Surgery, the Brazilian Academy of Military Medicine, and the Constantinian Society. He holds honorary fellowships in the International College of Surgeons, the American Association for the Surgery of Trauma, the American College of Chest Physicians, and the American College of Hospital Administrators. He is a member of the Association of Military Surgeons of the United States and the Society of Medical Administrators. He is a member of Phi Kappa Psi, Alpha Omega Alpha, Phi Rho Sigma fraternities, and a 33rd degree Mason.

ANOTHER STAR IN THE RESERVES

Manifred U. Prescott, San Francisco, California has been promoted to Brigadier General, Medical Corps, U. S. Army Reserve. In 1925 he accepted a commission as first lieutenant in the Medical Corps Reserve; in 1935 he was designated as a flight surgeon, and served on active duty during World War II.

ARMED FORCES EPIDEMIOLOGICAL BOARD MEETING

An organizational meeting for its newly planned Commission on Cutaneous Diseases was held by the Armed Forces Epidemiological Board in Philadelphia recently.

Representatives from the Army, Navy,

Air Force, Public Health Service, and the civilian field were present. Dr. Donald K. Pillsbury, Department of Dermatology and Syphilology, University of Pennsylvania, and Consultant to the Surgeon General of the Army, was designated by the Board as Director of the newly formed Commission.

Army Photo

MAJ. GEN. SILAS B. HAYS, USA

Major General Silas B. Hays has been nominated by President Eisenhower to be the next Surgeon General of the Army. He will succeed Major Gen. George E. Armstrong on June 1.

General Hays is a native of Minnesota. He received his medical degree from the University of Iowa Medical School in 1928, and accepted a commission in the Medical Reserve Corps of the Army at the time of his graduation. Shortly thereafter he entered upon an internship at Letterman General Hospital, San Francisco, California. He was commissioned in the Regular Army August 1929. He graduated from the Army Medical School and the Medical Field Service School in 1931, and from the Army Industrial College in 1940.

During the early part of World War II General Hays served in the Surgeon General's Office in the Supply Division, and later served as Chief of Medical Supply, European Theater of Operations. For outstanding service he received the Legion of Merit and the Oak Leaf Cluster to that award.

He became Chief, Supply Division, Office of the Surgeon General until May 1950 when he was assigned as Surgeon, U.S. Army, Pacific, and later as Surgeon, Japan Logistical Command. For this latter service during the Korean Conflict he was awarded the Distinguished Service Medal.

General Hays was promoted to brigadier general May 11, 1948 while in the Supply Division. He became Deputy Surgeon General, August 1951, and was promoted to major general in July 1952.

General Hays has also been awarded the Croix de Guerre with Palms, and the Order of Santé Publique from the Republic of France.

He is a member of the American Medical Association, the Association of Military Surgeons (which awarded him their Founders Medal in 1954), and Alpha Omega Alpha and Phi Rho Sigma medical fraternities.

RECEIVES AWARD

Colonel Joseph L. Bernier, DC, Chief of Dental and Oral Pathology, will receive the John R. Callahan Award for 1955. This award is made each year to the person who "has made a contribution to dental science of a very exceptional value" by the Callahan Memorial Commission of the Ohio State University.

POSTGRADUATE COURSE

"Medical Care of Atomic Casualties" which is a postgraduate course given at more or less regular intervals at the Walter Reed Army Medical Center, Washington, D.C., held its last course of the series of four in March.

In the past year attendants have included the Council on National Defense of the American Medical Association and representatives of more than one third of all the

medical schools in the United States. Professional personnel of the Air Force, Navy, Public Health Service, Veterans Administration, and Civil Defense have also been participants.

The next series of courses will probably begin in August 1955, and, due to an overwhelming response, will continue every two months thereafter.

LEGION OF MERIT

Lt. Colonel Paul A. Reed, MC, on duty as surgeon at Walter Reed Army Hospital, was awarded the Legion of Merit recently for his service in Korea from August 1953 to July 1954. During those dates he served as Surgical Service chief, 121st Evacuation Hospital, acting Surgical Consultant, Medical Section, 8th Army Headquarters; and as Commanding Officer of the 44th and 45th Surgical Hospitals.

A portion of the citation stated that his "perseverance and selfless devotion to duty in improving and safeguarding the health and welfare of patients were a source of inspiration to his associates and facilitated the accomplishment of the military medical mission in Korea."

Colonel Reed graduated from the University of Iowa Medical School in 1939.

ASS'T TO DEPUTY COMMANDER, WRAMC

Lt. Colonel Arthur C. Neeseman, MC, has been appointed as assistant to the Deputy Commander of Walter Reed Army Medical Center, in charge of its section at Forest Glen, Maryland. He succeeds Lt. Colonel Richard R. Brady, who has been assigned to Germany. The Center activities at Forest Glen include the Army Prosthetics Research Laboratory, the Audiology and Speech Correction Center, the ambulatory section of Walter Reed Hospital, and research projects of the Army Medical Service Graduate School.

CHIEF OCCUPATIONAL THERAPIST, WRAH

Major Ruth A. Robinson, WMSC, has been named as Chief Occupational Therapist at Walter Reed Army Hospital, a position which she formerly held at Fitzsimons Army Hospital.

Now vice-president of the American Occupational Therapy Association, Major Robinson will assume a three-year term as president of that organization in November 1955. She held the position of chief of the occupational therapy section and assistant chief of the Women's Medical Specialist Corps in the Office of the Surgeon General of the Army from 1948-1952.

MASS INOCULATIONS IN THE JET AGE

Under the direction of the Army Medical Service Graduate School a needle-free automatic injector has been designed. The new equipment is run by a motor-driven hydraulic pump, and allows the vaccination of as many as 1,600 persons daily.

The hypo-spray shoots a tiny jet of vaccine through the skin at about 250 pounds of pressure in about one second's time. Sterilization is not required after each shot; moreover, its dosage chamber is automatically reloaded from a fluid reservoir. Its usefulness in mass inoculation can readily be appreciated.

NURSE CORPS REPRESENTATIVE COLLEGE OF SURGEONS MEETING

Major Harriet H. Werley, ANC, career guidance officer for the Army Nurse Corps was the Army's representative at the nurses' sessions during the sectional meeting of the American College of Surgeons held in Cleveland recently.

The programs on nursing are an innovation for the College of Surgeons, and are being instituted to emphasize the importance of continuity of care given by doctors and nurses to the surgical patient.

POSTGRADUATE OBSTETRICAL NURSING COURSE

The first postgraduate Obstetrical Nursing Course to be held by the Army started at Walter Reed Army Medical Center on February 1 and will continue for 22 weeks from that date.

The director of the course, which carries 18 semester hours of credit with the Catholic University of Washington, D.C., is Major Peggy G. Jones.

Students of the course are: Capts. G. F. Cornish, E. A. Jones, Irene Lyon, and D. M. Cunningham; 1st Lts. B. E. Jackson, and M. I. Newson.

AMERICAN BOARD DIPLOMATES

The Army Medical Service Corps presently has on active duty eleven officers who have been certified by American Specialty Boards. In the group are three clinical chemists, three clinical psychologists, one industrial psychologist, three nutritionists, and one radiation physicist. Two of the group are colonels, seven lieutenant colonels, and two majors.

The clinical chemists are Lt. Cols. Monroe E. Freeman, Irving Gray, and Tomas C. Jefferis; the clinical psychologists are Col. Charles S. Gersoni, Lt. Col. Frederick A. Zehrer, and Maj. James W. Layman; the industrial psychologist is Col. Anthony C. Tucker; the nutritionists are Lt. Cols. Carl J. Koehn and Robert Ryer, III, and Maj. Ernest M. Parrott; and the radiation physicist is Lt. Col. Maxwell Dauer.

MEDICAL TRAINING CENTER—BAMC

The first anniversary of the Medical Training Center, a component of the Brooke Army Medical Center, was celebrated on March 1. Brig. Gen. L. Holmes Ginn, Jr., has been the commander since the opening of the center.

Over 12,000 combat aidmen and hospital corpsmen have been trained, with 3,100 presently participating. Training is continually being improved to keep abreast of modern combat requirements. Realism in its field training is the aim of the center which has many combat persons on its training faculty.

ASSIGNMENT AT BAMC

Lt. Colonel Burchard E. Wright, Jr., MC, has been appointed as Commanding Officer of the 67th Medical Group at Brooke Army Medical Center by the Center commander, Major General William E. Shambora. The group is composed of 11 combat-type medical units.

Colonel Wright was Preventive Medicine officer at the Seventh Army Headquarters in Europe prior to his assignment to Brooke Army Medical Center.

UNIT ACTIVATED AT BAMC

The 53rd Army Field Hospital, as a unit of the 67th Medical Group has been activated at the Brooke Army Medical Center, according to an announcement made by the commander of the center, Major General William E. Shambora.

The 53rd hospital left for Europe in April 1944 and landed in Normandy shortly after D-Day. The unit saw considerable service in Europe.

The commander of the 53rd hospital is Captain Jacob W. Taylor, and the group commander is Lt. Colonel Burchard M. Wright.

FORT BENNING HOSPITAL

A remodeled wing of the Fort Benning Army Hospital will provide additional space for the increased work load which the hospital has been experiencing.

More than 19,500 patients were admitted to the Fort Benning hospital last year, with a daily census of over 500, and outpatient visits totalling over 27,000 monthly.

Colonel Norman Wiley, MC, is Commanding Officer of the hospital and Lt. Colonel Slater Dozier is Chief of the Laboratory Service.

KOREAN DECORATIONS AWARDED

Colonel Louis K. Mantell, MC, Chief of the Urological Service at Tripler Army Hospital, was recently awarded the Military Order of Taiguk by President Syngman Rhee of the Republic of Korea.

The presentation was made in Honolulu by Mrs. Choong Chung Oh, the Korean Consul there. Colonel Mantell distinguished himself by his "high professional compe-

tence, exceptional skill, and unfailing good judgment" while serving with the 121st Evacuation Hospital of the Eighth Army in Korea.

Navy

Surgeon General—Rear Adm. Bartholomew W. Hogan

Deputy Sur. Gen.—Rear Adm. Bruce E. Bradley

MEMBERS OF NATIONAL BOARD

Rear Admiral Bartholomew W. Hogan, the Surgeon General, has been invited to serve as a member of the National Board of Medical Examiners. He has designated Captain Cecil L. Andrews, MC, Director of the Professional Division, to serve with him as a member of the Board.

ADMIRAL RYAN HONORED

On a recent visit to Panama Rear Admiral Daniel W. Ryan, DC, was made an honorary member of the Asociación Odontológica Panamena for his cooperation in encouraging good professional and friendly relations between members of the U. S. Navy Dental Corps and the dentists of the Republic of Panama. The presentation was made by Dr. Brin.

Admiral Ryan expressed his pleasure that relations had been so pleasant in the past and promised that he would do all possible to continue the same trend in the future.

Admiral Ryan was recently transferred from his position in the Bureau of Medicine and Surgery to assume duties as Inspector, Naval Dental Activities, Pacific Coast, with station at San Francisco, California.

BECOMES DENTAL INSPECTOR GENERAL

Rear Admiral Herman P. Riebe, DC, has been appointed as Inspector General, Dental, Bureau of Medicine and Surgery.

FILMS RECEIVE INTERNATIONAL RECOGNITION

Two Bureau of Medicine and Surgery films entered in the International Exhibition of Cinematographic Art held in Venice, Italy, received awards for excellence. They are: "Breathe and Live" (MN-7498a) and "Equilibration of Occlusion" (MN-7340). They were produced by the Bureau of Aeronautics under the direction of the Audio-Visual Training Section.

TROPHY PRESENTED

A "Trofeir" bearing the inscription "Central Hospitals of the Brazilian Navy," an instrument expressing the good will that exists between the Brazilian Naval Dental Corps and the United States Naval Dental Corps, was presented to the Naval Dental School, Bethesda, Maryland recently.

The "Trofeir," which is the Brazilian term for "Trophy of Great Distinction," was sent by Doctor Asdrubal Novaes, Lieutenant, Brazilian Naval Dental Corps, a former resident in Oral Surgery at the Naval Dental School. The presentation was made by Doctor Marcello Borges, Lieutenant, Brazilian Naval Dental Corps. The trophy was accepted in behalf of the Naval Dental School by Captain Curtiss W. Schantz, DC, Commanding Officer of the School.

PRESENTS CLINIC

LCDR Leo Botwinick, DC, on duty at the Naval Dental Clinic, Brooklyn, New York, will present a table clinic on "Endodontia in Daily Practice" at the Springfield Massachusetts Dental Group meeting to be held on April 14, 1955 at the Sheraton Kimball Hotel.

NAVY NURSE BREAKFAST MEETING

Navy Nurses, Navy Reserve Nurses and former Navy Nurses will get together at the National League of Nursing Convention to be held in St. Louis, Missouri, May 2-6. A breakfast will be held on Wednesday, May 4, in the Missouri Room of the Statler Hotel at 7:30 A.M. Tickets will be available at the National League of Nursing Ticket booth or at the Navy Nurse Corps exhibit for $2.00 each.

WOMAN DENTAL OFFICER PROMOTED

Dr. Sara G. Krout, Naval Dental Corps Reserve, on the staff of the Women and Childrens Hospital, Chicago, is the first woman to achieve the rank of commander in the dental branch of the Navy.

Dr. Krout received a commission as lieutenant on February 25, 1944, the first woman commissioned in the Navy Dental Corps. She went on active duty on June 1, 1945 and remained in the service until January 1946.

RETIREMENTS

Rear Admiral Sterling S. Cook, MC, was placed on the Officers Retired List on February 1. He was Commanding Officer of the Naval Hospital, Portsmouth, Virginia, which is now filled by Rear Admiral Ocie B. Morrison, formerly of the Department of Defense.

Other officers retired on February 1 with addresses are: Captain John M. Bachulus, MC, 4017 26th St., N. Arlington 7, Va.; Captain Frederic W. Farrar, MC, 1515 Taylor St., Corona, Calif.; Captain Gerald W. Smith, MC, 528 El Camino Real, Burlingame, Calif.; LCDR Floyd S. Haslam, MSC, 2430 N. Vermont Ave., Los Angeles 27, Calif.; LCDR Ancil B. Smith, MSC, RR#5, Frederick, Md.

Air Force

Surgeon General—MAJ. GEN. DAN C. OGLE
Deputy Surg. Gen.—MAJ. GEN. W. H. POWELL, JR.

FEDERAL HOSPITAL ADMINISTRATORS INSTITUTE

The Tenth Interagency Institute for Federal Hospital Administrators will be held April 25 to May 13th at the Sternberg Auditorium, Walter Reed Army Medical Center, Washington, D.C.

The Director of the Institutes, Colonel Byron L. Steger, MC, U. S. Army, has announced that the Air Force is sponsoring this Tenth Institute. Sponsorship rotates among the Army, Navy, Air Force, Public Health Service and Veterans Administration, although the appointment of the Directorship is for a period of several years, with the Director being responsible to the Bureau of Budget which has sponsored the overall program.

In connection with this Institute it should be mentioned that there is a Federal Hospital Institute Alumni Association for those graduates of the courses.

VETERINARY OFFICERS ATTEND COURSE

Two veterinary officers of the Air Force will attend the Air Command and Staff Course at Maxwell Air Force Base, Alabama, beginning September 1955. They are: Lt. Colonel Jack H. Hempy and Major Lloyd J. Neurauter.

Lt. Colonel Hempy is Chief, Professional Division, Office of the Assistant for Veterinary Services, Office of the Surgeon General, Air Force. Major Neurauter is Assistant Director of the Veterinary School, Gunter Air Force Base, Montgomery, Alabama.

FOREIGN OFFICERS AT AVIATION MEDICAL SCHOOL

Of the 100 medical officers taking the basic aeromedical course at the School of Aviation Medicine, Randolph Field, Texas, twelve are from foreign nations.

The foreign students are: Lt. Col. Lee Kyu Yong (Korea); Maj. Vicente López Coterilla (Spain); Maj. Yutaka Doi (Japan); Maj. Perfecto J. Barcelona (P.I.); Captains Bin Nam Soo, Kim Taek Il, Lee Nam Soo, Shim Bong Sop, and Sung Yung Hwan (all from Korea); Captain Bienvenido H. David (P.I.); Captain Raymond J. Stockmans (Belgium); and Captain Hendrik J. Wiggers (Netherlands).

KOREAN AWARD

Colonel Edgar L. Olson, USAF (MC), Chief of Clinical Medicine at the School of Aviation Medicine, Randolph Field, Texas, was awarded the Korean Military Merit Ulchi Medal with Silver Star.

The award was made for "immeasurable assistance" to the Republic of Korea in establishing its Air Force medical service. The presentation was made by Lt. Col. Lee Kyu Yong, one of the five Korean Air Force surgeons attending the School of Aviation Medicine.

MASS HEARING TESTS

Noise is a part of an aircraft. There is no engineer who could take it away. In the era of stratojets that noise is sometimes the equivalent of 300 times the pressure of a jackhammer. Flight surgeons justly fear that ear injury will result in such an environment. It was, therefore, decided to test the hearing anew of everyone entering the Air Force. A new machine was developed at the School of Aviation Medicine, at Randolph Field, Texas, to make the hearing tests realistic. The machine is called the Automatic Numerical Recording Audiometer; it was invented by Mr. F. A. Brogan, an electronics engineer.

The new audiometer can simultaneously test the hearing of a large number of people, making also an immediate tabulation of the results.

By the early discovery of slight defects in hearing later serious damages can be prevented. Certain regulations are in existence which prescribe weekly audiometric checkup for certain personnel employed in hazardous noisy areas.

DONALDSON MEDICAL CENTER

The 4421st Medical Service Group at the Donaldson, S.C., Air Force Base, has been inactivated and redesignated as the USAF Tactical Medical Center. The commander of the center is Colonel Paul C. Sheldon, USAF (MC).

Public Health Service

Surgeon General—LEONARD A. SCHEELE, M.D.

Deputy Surg. Gen.—W. PALMER DEERING, M.D.

MEDICAL OFFICER EXAMINATION

A competitive examination for appointment of Medical Officers to the Regular Corps of the Public Health Service will be held in various places throughout the country on June 7, 8, and 9. The examinations will include an oral interview, physical examination, and comprehensive objective examinations in the professional field.

Entrance pay for an Assistant Surgeon with dependents is $6,017 per annum; for Senior Assistant Surgeon with dependents, $6,918. Active duty as a Public Health Service officer fulfills the obligation of Selective Service.

Application forms may be obtained by writing to the Chief, Division of Personnel, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D.C. Closing date for filing applications is May 6, 1955.

APPOINTMENT, CHIEF DIVISION OF HOSPITALS

Dr. Clifton K. Himmelsbach was appointed as Chief, Division of Hospitals, Public Health Service, effective March 1. Since July 1953 he has been Assistant Chief of the Division.

In this new position Dr. Himmelsbach will have charge of the 16 hospitals and 125 outpatient clinics and offices for legal beneficiaries of the Public Health Service. This nationwide system of medical care facilities includes the hospitals at Lexington, Kentucky and Fort Worth, Texas, for treating narcotic addicts and the hospital at Carville, Louisiana, for patients with leprosy.

Dr. Himmselbach is a graduate of the University of Virginia (1931). After graduation he entered the Public Health Service as an intern at its hospital in New Orleans, and has been with that service since. He is a Fellow of the American Medical Association and the American College of Physicians, and a member of the Association of Military Surgeons.

APPOINTMENT AT NIH

Dr. Stuart Sessoms has been appointed

to the medical staff of the Director of the Clinical Center, National Institutes of Health.

He is native of North Carolina, a graduate of the University at Chapel Hill, and received his medical degree from the Medical College of Virginia. He received special training in internal medicine at the Public Health Service Hospital in Baltimore, the Johns Hopkins University School of Medicine, and the Memorial Center for Cancer and Allied Diseases in New York. Since 1953, he has been a member of the National Cancer Institute General Medicine Branch, and for a period served as Acting Branch Chief.

ASSIGNMENT IN ECUADOR

Mr. James D. Caldwell, a Public Health Service reserve officer has left for a new assignment in Ecuador. As Chief of the Health Field Party of the Institute of Inter-American Affairs in that country, he will also serve as Director of the Servicio Cooperativo Inter-Americano de Salud Pública of Ecuador. This organization is composed of a group of U.S. and Ecuadorian technicians operating a cooperative health and sanitation program within the Ministry of Health of Ecuador.

SOCIAL SECURITY

The appointment of a Medical Advisory Committee, set up to give counsel to the Social Security Administration on medical aspects of administering the new "disability freeze" provision in the social security law, has been effected by Charles I. Schottland, Commissioner of Social Security.

Dr. J. Duffy Hancock, Professor of Clinical Surgery at the University of Louisville School of Medicine, has agreed to accept the post of Chairman of the Medical Advisory Committee. He holds the Bronze Star, the French Croix de Guerre, and other decorations for his service in Europe during World War II.

The "disability freeze" provision is similar to the waiver of premium in commercial life insurance and permits a worker to keep his old-age and survivors insurance rights intact when he is totally disabled for work for an extended period. The determination as to whether a worker is totally disabled within the meaning of the law will be made by the vocational rehabilitation agency or other appropriate agency in the individual's own State.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.

Deputy Chief Med. Dir.—R. A. WOLFORD, M.D.

APPOINTMENTS

Dr. Williams W. Fellows, has been appointed assistant chief medical director for planning in the Veterans Administration Central Office Washington, D.C.

In that assignment Dr. Fellows will direct the planning of the medical care program of the Veterans Administration under the chief medical director for the 172 hospitals, 104 outpatient clinics and 17 domiciliaries.

Dr. Fellows is a veteran of both World Wars. During World War II he was a lieutenant colonel in the medical corps of the Army. He is a diplomate of the American Board of Surgery.

William K. Hinds, presently manager of the Veterans Administration Center at Jackson, Miss., has been named manager of the VA Center at Shreveport, La., to succeed the late Durell A. Hiller.

A. W. Woolford, has been assigned as manager of the Veterans Administration Center at Jackson, Miss.

Dr. Walter H. Buckholts, presently manager of the Veterans Administration hospital at McKinney, Texas, will in addition to his present duties, assume the management of the VA hospital at Dallas, Texas.

Dr. John S. Herring, chief of professional services at the Veterans Administration (Kennedy) hospital in Memphis, Tenn., has been appointed manager of the Veterans

Administration hospital in Montgomery, Alabama. Dr. Herring served in the Army Air Force during World War II and attained the rank of lieutenant colonel. He is a diplomate of the American Board of Obstetrics and Gynecology.

Dr. Daniel R. Robinson has been appointed as manager of the Veterans Administration hospital in Dwight, Illinois. He received his medical degree from the University of Maryland Medical School in 1933, following which he served a residency in surgery at Mercy Hospital, Baltimore.

During World War II Dr. Robinson served with the Air Force from 1942 until he was separated in 1946 in the grade of major. He has been with the Veterans Administration since April 1953.

PHARMACY RESIDENCY TRAINING PROGRAM

May 10 is the deadline for filing applications for the 1955 fall semester residency training program for currently registered pharmacists who have a B.S. degree.

This program sponsored by the Veterans Administration will be conducted at Los Angeles, California, and Houston, Texas. Two universties, Southern California and the University of Houston, will cooperate in the program which will lead to a Master of Science in Pharmacy degree.

Those interested should file a Form 57 (Civil Service application) with the Executive Secretary, Central Board of U. S. Civil Service Examiners, Veterans Administration, Washington 25, D.C.

GI TRAINING EXTENDED

Servicemen in the Armed Forces on January 31, 1955 can now earn up to 36 months of entitlement to education and training under the Korean GI Bill. Public Law 7, 84th Congress, signed by the President makes this additional credit possible.

Previously, a Presidential proclamation had set January 31 as the cut-off point for GI Bill entitlement; time spent on active duty after that date would not count toward training. Now, however, veterans who entered military service on or before January 31 will continue to build up GI training entitlement after that date.

Training may not be given after January 31, 1965, or eight years after discharge or release, whichever comes first.

Miscellaneous

CENTENNIAL

Saint Elizabeths Hospital, one of the world's largest and best known institutions for the care and treatment of the mentally ill, is celebrating its centennial, having been founded March 3, 1855.

The hospital is now under the Department of Health, Education, and Welfare, although for years it had been under the Department of Interior.

The hospital is located in Anacostia, suburb of the District of Columbia, and derives its name from the plot of ground which was known as Saint Elizabeths. The founding of the hospital was largely the work of one person, the Bostonian, Dorothea Lynde Dix. It was she was obtained the original appropriation of $100,000, selected the site, arranged for the purchase, and chose the first superintendent.

The hospital today has 7,500 patients and is the only mental institution approved by the American Medical Association for general internship. The present superintendent, well known in psychiatric circles, is Dr. Winfred Overholser.

DC VETERINARY MEDICAL ASSOCIATION

Lt. Colonel Thomas C. Jones, Army Veterinary Corps, was recently elected president of the District of Columbia Veterinary Association. This association is made up of members of the Armed Forces, veterinarians from the Department of Agriculture, the Department of Health, Education, and Welfare, the District of Columbia administrative offices, the University of Maryland and practitioners in the Washington, D.C. area.

RESIDENCIES IN PSYCHIATRY AVAILABLE

The Veterans Administration Hospital, Lyons, New Jersey, has available residencies in Psychiatry, for one to three year periods. These are fully accredited by the American Board of Psychiatry and Neurology.

The training program consists of lectures, conferences, and seminars under the direction of the Department of Psychiatry, New York Medical College. Intensive training, both intramurally and through rotation in special hospitals and clinics in the adjacent area is included. There is, in addition, a series of extensive guest lecturers as well as an Annual Institute at the hospital.

Training may commence at any time. The manager of the hospital should be contacted by interested physicians.

PHYSICIAN VACANCIES, PORTSMOUTH, VA.

The Norfolk Naval Shipyard, Portsmouth, Virginia, has vacancies for civilian doctors seeking positions in the field of industrial medicine. Salaries range from $5,940 to $8,360 depending upon qualifications and position to be filled. Interested physicians may address: S. J. Casey, Employment Superintendent, Norfolk Naval Shipyard, Portsmouth, Va.

CAREER OPPORTUNITIES

Vocational rehabilitation is a field of career opportunities which promises to increase and expand in the next few years. New York University will recommend candidates for traineeship grants to be provided by the federal government for the fall 1955 term. Dr. Spaulding of that university stated that 1000 specialists a year will be required to train the disabled and handicapped.

Federal grants are open to college graduates who are American citizens, or who have indicated that they intend to become American citizens. The grants for the first two years are $1,600 annually; for the third year $2,400; and for the fourth year $2,800. Applications should be sent to Dr. Roland H. Spaulding, New York University School of Education, New York City.

MEETING NOTICE

The American Physical Therapy Association has announced that its 32nd Annual Conference will be held at the Hotel Jefferson in St. Louis, Mo., June 20-24, 1955. The scientific program will be of a workshop nature. This will be followed by three half-day sessions of ten workshop groups, who will discuss various areas of professional interest. Headquarters of the Association are at 1790 Broadway, New York 19.

PROGRESS OF GERONTOLOGY

Aging, a bi-monthly bulletin published by the Department of Health, Education, and Welfare, mentions in its March 1955 issue the operation, since 1946 at Cornell University, Ithaca, New York, of a "Home for Aged Dogs." This is not a high-level pound but a laboratory where the diets and diseases of our canine oldsters are studied with a view toward benefitting us human oldsters.

Here is another example of the usefulness of man's best friend.

"STOP RHEUMATIC FEVER"

A new 16 mm. black and white sound motion picture film is available for purchase at $16 per copy. Running time is about 12 minutes. Literature accompanies the film. Because of the low price there will be no rental film.

The new motion picture is part of a health education unit developed by the National Heart Institute and Heart Disease Control Program in cooperation with the American Heart Association.

This film can be obtained from the American Heart Association Film Library, 13 East 37th Street, New York 16, N.Y.

PERSONAL AFFAIRS RECORD BOOK

A very handy personal affairs record book, designed for those in the military service, but adaptable for others, is available at the price of one dollar from the Military Service Publishing Company, Harrisburg, Pennsylvania.

The book is divided into twelve sections

with from four to seven subsections and space to enter data of a personal nature which might be needed for the individual or his survivors. Should one desire additional pages this can be accomplished by removing the metal stapling and adding the desired number of pages.

This book will be a valuable one for those who desire to keep their personal affairs recorded for ready reference.

KINETIN

Carlos Miller and Prof. Folke Skoog, botany department, and Malcolm von Saltza and Prof. F. M. Strong, department of biochemistry, University of Wisconsin, have isolated a compound called kinetin, which causes plant cells to divide and new cells to form as long as the substance is in the culture media. This substance may be one of the most important chemicals responsible for a basic property of growth and life.

ANNIVERSARY

The 200th anniversary of the birth of Samuel Hahnemann, the physician who first organized the homeopathic system of medicine, will be celebrated in Washington, D.C. at the Shoreham Hotel from April 10th to April 15th. The celebration will be under the auspicies of the American Institute of Homeopathy, the first national medical society to be founded in this country.

Prominent physicians from many nations will attend. Among them will be Sir John Weir of London, England, physician to the British Royal Family the past 35 years, and Dr. Pierre Schmidt of Geneva, Switzerland.

New York Chapter

U. S. Army Photo

BRIG. GEN. CRAWFORD F. SAMS, MC, USA
1ST VICE-PRES. NEW YORK CHAPTER

MAJ. GEORGE G. TRATTNER, DC, USAR
2ND VICE-PRES. NEW YORK CHAPTER

OBITUARIES

Capt. Ruskin M. Lhamon, U. S. Navy, Ret.

Ruskin Marion Lhamon, U. S. Navy, Retired, died in Sarasota, Florida, January 24, 1955.

Born July 22, 1885, in Kenton, Ohio, Captain Lhamon received his Bachelor of Arts degree from the University of Missouri in 1907 and the degree of Doctor of Medicine from Washington University, St. Louis, Missouri, in 1910. He entered the Naval service in 1914; was promoted to Captain, Medical Corps, USN, in 1939; and was placed on the Retired List of Officers of the Navy in May 1947.

Captain Lhamon was a member of the American Medical Association and a Fellow of the American College of Surgeons. He is survived by his wife, Mrs. Mary Taylor Lhamon, 639 Lantana Avenue, Sarasota, Florida.

RAdm. Frederick R. Hook, U. S. Navy, Ret.

Frederick Raymond Hook, U. S. Navy, Retired, died in the Naval Hospital, San Diego, California, February 2, 1955. He was born in Rossville, Kansas, March 19, 1889. He received the degree of Doctor of Medicine from University Medical College, Kansas City, Missouri, in 1913. He was appointed an Assistant Surgeon, U. S. Naval Reserve Force, in 1917. Promoted to Captain, Medical Corps, USN, in 1941, he was advanced by reason of his combat decorations to the rank of Rear Admiral when placed on the Retired List of Officers of the Navy in May 1948.

Admiral Hook was a member of the American Surgical Association and the American Academy of Orthopedics; a Fellow of the American College of Surgeons; and was certified by the American Board for Surgery.

He is survived by his wife, Mrs. Hester Hook, 861 Sutter Street, San Francisco, California.

Interment was in Fort Rosecrans National Cemetery, San Diego, California.

Capt. Virgil H. Carson, U. S. Navy, Ret.

Virgil Hope Carson, Captain, USN, Retired, inactive, died February 9, 1955, in Peralta Hospital, Oakland, California. His age was 62.

Born in Danville, Virginia, January 5, 1893, Captain Carson received the degree of Doctor of Medicine from the Medical College of Virginia in 1914. He was appointed an Assistant Surgeon in the Medical Corps of the Naval Reserve on August 25, 1915. He later transferred to the Regular Navy and attained the rank of Captain, Medical Corps, USN, in August 1939. He was retired for physical disability on July 1, 1943.

Captain Carson, known widely in the Navy for his work in urology, was a member of the American Medical Association, the American College of Surgeons, and the Association of Military Surgeons of the United States. He was entitled to wear the Victory Medal (World War I), the Mexican Service Medal, the Haitian Campaign Medal, the American Defense Service Medal, the American Campaign Medal, and the World War II Victory Medal.

Captain Carson is survived by his wife, Mrs. Helen Carson, 245 Fairmont Drive, Oakland, California.

Interment was in Presidio National Cemetery, San Francisco, California, February 11, 1955.

Lt. Comdr. Francis N. Johnston, U. S. Navy, Ret.

Francis Neil Johnston, Lt. Commander, USN, Retired, inactive, died in Salem Memorial Hospital, Salem, Oregon, February 9, 1955.

Born in Encampment, Wyoming, October 12, 1912, LCDR Johnston received the degree of Doctor of Dental Medicine from North Pacific College of Oregon, School of Dentistry, in 1943. He was appointed an Ensign, USNR, to rank from May 2, 1942, and transferred to the Regular Navy in 1943. He resigned his commission in 1946; was reappointed a Lieutenant, DC, USNR, in 1947; and again transferred to the Regular Navy in 1951. He was retired for physical disability in December 1954.

LCDR Johnston is survived by his wife, Mrs. Mildred Johnston, Salem, Oregon.

Interment was at Rawlins, Wyoming.

Lt. Cdr. Horace E. Spruance, U. S. Navy, Ret.

Horace Evans Spruance, Lieutenant Commander USN, retired, inactive, died in the Naval Hospital, San Diego, California, February 20.

A native of Delaware, LCDR Spruance was born at Smyrna, Delaware, July 31, 1890. He received the degree of Bachelor of Arts from Delaware College in 1911 and the degree of Doctor of Medicine from Jefferson Medical College in 1915. He was appointed a Lieutenant, junior grade, Naval Reserve Force, in 1917, and subsequently transferred to the Regular Navy. He was a nose and throat specialist during most of his Naval service. He was retired for physical disability in 1924.

He is survived by his wife, Mrs. Vivian Spruance, 3369—28th Street, San Diego, California.

Col. Calvin H. Goddard, U. S. Army, Ret.

Calvin H. Goddard, Colonel, U. S. Army, retired, died from a heart attack at his home, February 22.

Colonel Goddard was born at Baltimore, Maryland, October 30, 1891. He graduated from Johns Hopkins University School of Medicine in 1915, from which University he received his Bachelor of Arts cum laude degree in 1911. He joined the Army and was honor graduate of the Army Medical School in 1917. During World War I he served overseas in France, Germany and Poland. He resigned his commission, having attained the rank of major, in 1920 to become assistant director of Johns Hopkins Hospital. From 1924 to 1925 he directed Cornell Clinic, New York.

Colonel Goddard was particularly known in the field of military history and ordnance. He developed the science of identifying fired bullets, and assisted in the development of the first lie detector. In 1929 he established at Northwestern University the first scientific crime laboratory in the United States and was managing director until 1933. In 1935 he was awarded the Guggenheim Foundation fellowship to write a book on arms identification. Later he studied in Europe.

Colonel Goddard was recalled to active service in 1941 and was assigned to the historical section of the Army War College. He was chief of the historical section of the Ordnance Department from 1942-1945, when he became a member of the historical division of the War Department. In 1947 he went to the Far East to develop the criminal investigation laboratory under General MacArthur. Because of illness Colonel God-

dard was returned to the United States in 1951. He became chief of the historical section of the Office of the Surgeon General of the Army. In June 1954 he was retired for physical disability.

Colonel Goddard was awarded the Legion of Merit and the Order of the Crown of Italy. He was a member of the Army Ordnance Association, American Military Engineers Association, the Association of Military Surgeons, the American Historical Association and a number of societies on medical jurisprudence.

Colonel Goddard is survived by his wife, 3533 Quebec St., N.W., Washington, D.C., and two married daughters.

Interment was at New Kent County, Virginia.

BOOK REVIEWS

THE BIOLOGY OF MAN. By John S. Hensill, Ph.D. Associate Professor of Biology, San Francisco State College, with Chapters on Development, Body Framework, and Pregnancy and Birth, by Joel F. Gustafson, and Chapters on The Disease Process and Invading Agents, by Herman Zaiman. 440 pages. The Blakiston Co., New York, 1954. Price $5.50

This is an introductory guide to the study of biology designed for those beginning the study of the subject at the college level. The biology of man is the central theme and the organization of the text follows the life history of man as a biological organism. It begins with the fertilization of the egg in the human species followed by a description of the developmental history of *homo sapiens* to adulthood. Then come sections on anatomy and physiology and the reactions of the human organism to its environment including the disease process. Finally, the book concludes with a section on reproduction.

The text is well illustrated and should be useful to the students for whom it is designed. However, it is to be deplored that the authors did not see fit to include lists of references for additional reading so as to give the students a better idea of the fact that biology is not a closed subject to be encompassed beween the covers of a book but is a growing and evolving body of knowledge.

MORRIS C. LEIKIND

MAXILLOFACIAL ANATOMY. By Harry H. Shapiro, D.M.D., Assistant Professor of Anatomy, College of Physicians and Surgeons, Columbia University; Consultant, Army Medical Service Graduate School. The J. B. Lippincott Co., Philadelphia, Montreal, London. Price $12.00

As the author states in his preface, "This book is specifically designed to suit the particular needs of students and practitioners of dentistry and medicine for practical information on the morphologic, functional and roentgenologic anatomy of the face, the jaws and the associated structures of the head and neck."

The same fine qualities which have made Dr. Shapiro's *Applied Anatomy of the Head and Neck* a valued member of numerous professional libraries are characteristic of this new book. In addition to a thorough knowledge of his subject and an ability to write clearly and concisely, the author has been eminently successful in teaching anatomy by a correlation with clinical findings and clinical procedures. This teaching principle has been applied to the book, contributing a better understanding of both the anatomy and the associated clinical picture.

Much of the best of Dr. Shapiro's previous writings and illustrations have been incorporated in this book. Much of his formerly published material has been rewritten and otherwise brought up to date. The many revised and/or new illustrations are in keeping with the quality of his previous best. The bibliography supplied at the end of the book provides an extensive source of additional reference material.

It is believed that this book is destined to become a popular and familiar reference for students and practitioners of both dentistry and medicine.

LT. COL. RUSSELL W. SUMNICHT,
DC, USA

STELLATE GANGLION BLOCK. By Daniel C. Moore, M.D., Director, Department of Anesthesiology, Mason Clinic, Chief of Anesthesia, Virginia Mason Hospital, Seattle, Washington. 280 pages, illustrated. Charles C Thomas, Springfield, Illinois, 1954. Price $10.50

This thoroughly interesting and provocative monograph should arouse much interest from a variety of the medical and surgical specialties. After a concise, practical account of the anatomy and physiology of the autonomics having to do with the lower cervical-upper thoracic levels, the author accounts for a surprisingly large number of clinical entities for which chemical assault upon the stellate ganglion has been used. While it is understandable that the author, an anesthesiologist, may be enthusiastic for this treatment in instances which might not appeal to every clinician, yet he does recognize the limitations of the procedure, and is

well aware of the controversy over the use of stellate ganglion block in certain conditions, such as in the event of cerebral vascular "accident." The dosage and effects of pontocaine, xylocaine, novocaine, methycaine, and intracaine are given in a very useful chart on page 50, and the author is to be commended for his detailed and practical discussion of the technique, even *art*, of this procedure. Figure 74, showing a leg brace in place, and some of the accompanying text, seems to be a bit out of place in the book, and the author's use of the term "cervico-brachial neuralgia,"—a waste basket device, is to be deplored.

The book is beautifully printed and set up. The illustrations, drawn specially for the book, are the best this reviewer has seen in the depiction of the cervical and thoracic autonomic chain. The illustrations for the technique are likewise very good. The references to the literature are both copious and of recent date.

COL. JOHN MARTIN, MC, USA

ADVANCES IN INTERNAL MEDICINE.—Vol. VI. Editors: William Dock, M.D., Long Island College of Medicine, Brooklyn; and I. Snapper M.D., Beth-El Hospital, Brooklyn. The Year Book Publishers, Inc., Chicago. 1954. Price $10.00.

This is the sixth volume of this well known annual.

The present edition contains ten articles, monographic in size and style on subjects of current interest in the various facets of medicine.

The editors are to be commended for the excellent choice and range of material. The subjects covered are:

Uropepsin, by Donald C. Balfour, Jr., University of Southern California School of Medicine and the Los Angeles County Hospital; Glucagon, the Hyperglycemic-Glycogenolytic Hormone of the Pancreas, by Piero P. Foa, The Chicago Medical School; Diagnosis of Cancer of Internal Organs by Papanicolaou Technic, by Ruth M. Graham, Vincent Memorial Hospital and the Gynecologic Service of Massachusetts General Hospital; Spatial Vectorcardiography, by Arthur Grishman, the Mt. Sinai Hospital, New York; The L. E. Cell Phenomenon, by Malcolm M. Hargraves, Mayo Clinic, Rochester; Biopsy Studies of the Liver and Kidney, by Poul Iversen, M. Bjørneboe, and N. B. Krarup, Kommunehospitalet, Copenhagen, Denmark; Thrombotic Thrombocytopenic Purpura, by Karl Singer, Michael Reese Hospital, Chicago; Porphyria, by C. J. Watson, University of Minnesota; Diaphragmatic Hernia, by Sydney Weintraub, New York Hospital and Cornell University Medical College; and The Determination of Insulin in Blood, by A. F. Willebrands and J. Groen, Wilhelmina-Gasthuis, Amsterdam, The Netherlands.

To select or single out any one or several of the articles for discussion would merely reflect the reviewer's field of interest and should not be interpreted as lending priority over other sections on the basis of superiority or clinical value. All the articles are carefully prepared, worthwhile and timely. The section "Diagnosis of Cancer . . . by Papanicolaou Technic," justifies the opinion that we have an excellent tool for the early diagnosis of malignancy which, when critically applied, a positive test may well be considered as ample grounds for the diagnosis. "Spatial Vectorcardiography" is clearly presented and should prove most valuable to the practitioner or student interested in cardiology. The writer has made out an excellent case in support of his opinion that spatial vectorcardiography has made a three fold contribution to electrocardiography, i.e., (1) "It has provided the method of choice for teaching electrocardiography," (2) ". . . has provided a superior diagnostic tool at present, as an adjuvant to clinical electrocardiography, and containing potentialities to replace the latter altogether," (3) "It has stimulated . . . search for answers to numerous related problems. . . ." The section on Porphyria is most refreshing. The author, who has been untiring in his efforts to carry to the profession a clearer understanding of our knowledge of Porphyrin metabolism, has most commendably accomplished his assignement. This section merits reading by any physician interested in internal medicine since porphyria may manifest itself in many bazaar ways, and, unless considered, will frequently go on unrecognized.

The other papers are equally informative, clearly and succinctly presented.

A voluminous table of references is found at the close of each contribution. A complete author index and an ample subject index is provided.

This volume should prove an excellent source of information on the current subjects and should receive the same wholesome reception enjoyed by the five previous editions.

COL. CHARLES R. MUELLER,
MC, USA (RET.)

HISTOLOGY. By Roy O. Greep, Ph.D., Dean and Professor of Dental Science, Harvard School of Dental Medicine with thirteen contributors. 953 pages, illustrated. The Blakiston Company, 1954. Price $15.

The second major contribution to the teaching of the histology within the last 30 years to come from Harvard, Dean Greep's "Histology" is a worthy successor to its predecessor Lewis and Stohr's "A Textbook of Histology." Students of histology and pathology will recall that many years ago Prof. "Duffy" Lewis of Harvard Medical School published an American edition of Stohr's Histology in which he introduced the embryologic approach to the study of histology, an approach which was not welcomed with enthusiasm by Prof. Stohr. After 2 editions, the textbook was revised by Prof. J. L. Bremer, a contemporary and close associate of Lewis. Of the several textbooks of histology available to the medical students of the 20's and 30's none surpassed Bremer's revision in clarity of presentation and readability. Prof. Weatherford, another colleague, undertook subsequent revision of the textbook but his untimely death prevented completion of the work.

Originally designed as the sixth edition of this book, Greep's "Histology" is indeed a "new text." Not only does it present the information on recent histochemical and cytochemical advances needed by medical students, histologists, pathologists and researchers, but the book successfully achieves its goal of "presenting microscopic anatomy in such a way as to emphasize its contribution to the totality of human biology."

There are 13 major contributors, ranging from the author who is Professor of Dental Science and Dean of the Harvard School of Dental Medicine, through an otologist, a dermatologist, an internist, 3 zoologists (one interested in the eye), a biologist and 5 anatomists, all having two things in common, an interest in morphology and membership on the Harvard faculty at one time or another. The result is a classic textbook of histology covering morphology and function. Its 648 figures with many camera lucida reproductions, schematic drawings and a number of color plates adequately illustrate the 900 pages of the text, which, because of multiplicity of authors, manifests a varied style and presentation but retains its lucidity and interest.

LT. COL. F. K. MOSTOFI, MC, USAR

MYOCARDIAL INFARCTION—ITS CLINICAL MANIFESTATIONS AND TREATMENT WITH ANTICOAGULANTS. A study of 1031 cases. By Irving S. Wright, M.D., Charles D. Marple, M.D., and Dorothy Fahs Beck, Ph.D. 656 pages.

Published for the American Heart Association by Grune & Stratton, New York, 1954. Price $8.50.

This is the report of the Committee on Anticoagulants of the American Heart Association on the value of anticoagulant therapy in myocardial infarction. Based on a seven-year cooperative study from sixteen different medical centers, the study is the most authoritative and complete of its kind.

The Committee is to be complimented, not only for the great care expended in the organization of the study, the gathering together of the massive data, analyzing these data, and then subjecting them to further analyses, but also—and most important to us—they are to be complimented for marshalling these complex data into an organized, clear, concise report. Conclusions are not based on arm chair philosophy, but are based on an objective and searching analysis of the data.

While this report is presented in great detail with all important tables included, the reader may obtain a quick grasp of essentials by reading the excellent summaries at the end of each chapter.

Of particular value is the Appendix dealing with instructions for administering the various types of anticoagulants now in use, their indications, toxicity, and contraindications. In short, this is an honest, critical objective appraisal of an excellent study. It will serve as "the gospel" for anticoagulant therapy. Every physician who treats patients with myocardial infarction should be thoroughly familiar with the contents of this book.

CAPT. FRANK A. FINNERTY, JR., MC, USAR

SURGERY OF THE ELBOW. By Frederick M. Smith, M.D., Associate Professor of Clinical Orthopaedic Surgery, Columbia University, New York City. 340 pages with 153 illustrations. Charles C Thomas, Springfield, Illinois, 1954. Price $10.75.

In this timely monograph on the complex elbow joint the author has incorporated an extensive amount of information on various conditions in and around the elbow which are amenable to surgical, physiotherapeutic,

radiotherapeutic or a combination of these therapeutic measures.

In a clear, concise, readable style, fractures, dislocations and other traumatic conditions in the region of the elbow are defined, the pathology of fractures and fracture healing discussed and the anatomy of the elbow region described. The author has called upon experience to explain the signs and symptoms of fractures and dislocations, the physical examination and general principles of fracture treatment which results in the best functional result for the patient. Various fractures and their complications in the vicinity of the elbow joint are discussed and adequately illustrated by reproductions of x-rays and line drawings.

Surgical management of the early case as well as of the late complications and means to prevent them are fully covered. The need for early active exercise of the joint to obtain a good functional result is stressed. For completeness, non-traumatic conditions of the elbow and the treatment therefore are included along with an excellent bibliography. The author has succeeded in compiling in this monograph a store of information on conditions affecting the elbow joint and their management not obtainable in another single reference. This book should prove to be a valuable reference book and should be in the library of every orthopaedist as well as other surgeons who treat traumatic conditions in the region of the elbow joint.

COL. JOSEPH W. BATCH, MC, USA

CLINICAL ASPECTS OF THE AUTONOMIC NERVOUS SYSTEM. By L. A. Gillilan, Ph.D., M.D., Associate Professor of Anatomy, Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania. 316 pages, illustrated. Little, Brown and Company, Boston and Toronto, 1954. Price: $6.50.

This is a very compact volume on the autonomic nervous system. It is divided into two parts, the first a rather detailed discussion of the anatomy of the autonomic nervous system. In this part the author, in clear, concise terms, discusses the cerebral centers and the autonomic nervous system, the anatomy of the peripheral autonomic nervous system, central autonomic pathways, innervation of structures in the head region, visceral sensation and embryology.

Among other things in the 141 pages of Part I, he discusses chemical mediation of nerve impulses. Tables listing drugs acting upon the sympathetic and parasympathetic divisions are included. In the first part of the text there are also many illustrations of anatomy and pathways in this section.

The second part encompasses the clinical aspects of the autonomic nervous system, divided into sections devoted to the cardiovascular system, respiratory tract glands, digestive system, urogenital system and visceral pain from the abdomen and pelvis. The author carries through the text the clinical aspects of the autonomic nervous system, integrating changes brought about by operative procedures and drugs. At appropriate places the author discusses emotional and psychosomatic effects. Neurohumeral mechanisms are discussed where applicable. The author is to be congratulated on gleaning from extensive literature the pertinent aspects pertaining to the subject. There are many references throughout the chapter to his source of information and these are compiled in a bibliography. The index appears to be adequate.

One would say that the author has accomplished his purpose in compiling this excellent reference text on clinical aspects of the autonomic nervous system. It is a neurological approach which should be of interest to clinicians, teachers and others as an excellent reference in this field.

COL. FRANCIS W. PRUITT, MC, USA

COMPARATIVE ANATOMY OF THE VERTEBRATES. By George C. Kent, Jr., Associate Professor of Zoology, Louisiana State University. 530 pages, illustrated. The Blakiston Co., Inc., New York, 1954. Price $6.00.

This is one of the better texts of comparative vertebrate anatomy. It is intended for use in a one semester college course to be supplemented by lecture and laboratory study. Fundamental similarities throughout the vertebrates are emphasized. In the opening paragraphs of each chapter a basic architectural pattern for the system under discussion is generally introduced.

The first four chapters include a survey of the fields of comparative vertebrate anatomy and embryology. The twelve succeeding chapters relate to the various systems, e.g., skeletal, respiratory, circulatory, etc. In the combined chapters devoted to the skeletal system there are 118 pages while the average chapter contains 33 pages. Since many similar texts apportion one-fifth of their space to the skeletal system, no criticism is implied.

Theories of evolution are virtually omitted, the classification of vertebrates is sketchy and the bibliography of 85 references seems rather short. Although new words are defined as they are introduced, a glossary ought to have been included. The difficult vocabulary of comparative anatomy is unavoidable, but the reading and the understanding of this text is somewhat complicated by the author's involved style and elaborate vocabulary.

A wealth of illustrative material, a fine index and a valuable summary at the end of each chapter are excellent features. The summary, especially, is important in that it affords the students a preview and a review.

LT. COL. DAN SASSMORE, USAF (VC)

SURGICAL TREATMENT OF CANCER OF THE CERVIX. Edited by Joe V. Meigs, M.D., Clinical Professor of Gynecology, Harvard Medical School. 474 large-format pages, 205 step-by-step illustrations. Grune & Stratton, Inc., New York, 1954. Price $12.00.

This volume of papers concerning the surgical treatment of cancer of the cervix, edited by Dr. Meigs, presents in one volume a complete step-by-step description of every significant operation that has been advanced for cancer of the cervix.

The anatomy of the blood vessels is reviewed and illustrated, lymph nodes and lymph channels, and paths of extension of cancer are discussed, as well as the two methods (retro- and transperitoneal) of lymph node dissection.

Dr. Meigs hopes that this volume will give the surgeon or gynecologist who wishes to perform these operations an idea of the meticulous care needed before, during, and after surgery.

The description of the operations themselves are most complete. Indications and contraindications are discussed fully, as are complications, pre- and postoperative care, prognosis, and results.

This volume is recommended to the gynecologist, surgeon, and pathologist, who will find this book invaluable as will every physician who has contact with cancer of the cervix.

COL. JOHN W. DARROUGH, MC, USAR

CURRENT CONCEPTS IN DIGITALIS THERAPY. By Bernard Lown, M.D., formerly Assistant in Medicine, Peter Bent Brigham Hospital, and Samuel A. Levine, M.D., Clinical Professor of Medicine, Harvard Medical School. 164 pages. Little, Brown and Co., Boston, 1954. Price $3.50.

The authors have produced a well-written, easily read, extremely interesting treatise on the practical aspects of digitalizing a patient in heart failure. Theories on the effectiveness of digitalis on cardiac and extracardiac action are reviewed and a point is made of digitalis being therapeutically effective only in so-called "low output failure" and not in "high output failure." The choice of digitalis drugs and intravenous and oral dosages are also discussed. In expounding the current theories on the electrolyte-digitalis relationship, the authors bring out the vital importance to the clinician of this relationship. In addition, the dangers of digitalis intoxication following potassium loss through diuretic therapy are described, as well as the toxic effects of overdigitalization. One result from digitalis intoxication is paroxysmal atrial tachycardia with block, which is dealt with in detail. A chapter is also devoted to a digitalis intolerance test. This test, when properly used in carefully selected cases, helps to determine whether digitalis should be given or should be withheld. In this monograph the physician will find up-to-date theories on digitalis and practical suggestions from two eminent cardiologists on the use of digitalis. The bibliography is exceptionally complete with 337 references.

LT. COL. FRANK A. GOSS, USAF (MC)

PROGRESS IN CLINICAL SURGERY. Symposium edited by Rodney Smith, M.S., F.R.C.S., with 20 contributors. 414 pages. Little, Brown and Company, Boston, 1954. Price $7.50.

This British book, as stated by the Editor in his preface, aims to assist young surgeons with recent hospital appointments or recently trained surgeons preparing for board examination. Supposedly, subjects in which there have been distinct advances in the past 15 years have been chosen for inclusion and more common subjects have been omitted. Certainly, there will be no unanimity of opinion as to what subjects should be included and many surgeons will disagree with the emphasis placed. Naturally, with many contributors, there is considerable variation in excellence, and some repetition, as for example, fluid and electrolyte problems which are discussed in several chapters. The bibliography at the end of each chapter varies from scanty to adequate, and

chapter subject matter includes material in the fields of anesthesiology, neurosurgery, urology, thoracic surgery and orthopedics, in addition to general surgery. The chapter on Cancer of the Mouth and Pharynx states what is fairly widely accepted current policy. The author of the section on Hiatal Hernia and Reflux Esophagitis does not have the American concept of the condition and one of the best chapters is that on Stomach and Duodenum. In many instances, an attitude more conservative than current practice is demonstrated. For example, one short paragraph disposes of primary colectomy and ileostomy for ulcerative colitis and a similar short paragraph on bilateral adrenalectomy for advanced carcinoma of the breast states that the remedy is a desperate one in a very sick patient with unpredictable results, requiring highly skilled nursing and first class biochemical facilities. The list of cardiac lesions amenable to surgical correction is several years behind current thought, and regarding patent ductus arteriosus, the author states that the division and suture method is hazardous in most surgeons' hands and therefore not widely practised. The young surgeon will do better by reviewing current journals, and it is felt that this book will have limited appeal.

COL. WARNER F. BOWERS, MC, USA

U. S. Army Photo

MAJ. GEN. GEORGE E. ARMSTRONG, Surgeon General of the Army, congratulates MAJ. GEN. ISADOR S. RAVDIN, MC, USAR, on his recent promotion to that rank. He is the first reserve physician to attain that rank while on inactive duty.

NEW BOOKS

Prefrontal Leucotomy and Related Operations. Anatomical Aspects of Success and Failure, by Alfred Meyer, M.D. (Bonn) and Elizabeth Beck. Charles C Thomas, Publisher, Springfield, Ill. Price $2.25.

Amputations, by Leon Gillis, M.B.E. Grune & Stratton, Inc., New York, 1955. Price $12.75.

Progress in Allergy, edited by Paul Kallos, Little, Brown & Co., Boston 6, Mass. Price $20.00.

Financing Hospital Care for Nonwage and Low-Income Groups, Vol. 3. The Blakiston Div., McGraw-Hill Book Co., Inc., New York, N.Y. Price $2.50.

Abdominal Operations, by Rodney Maingot, F.R.C.S. Appleton-Century-Crofts, Inc., New York, N.Y. Third Edition. Price $24.50.

Die Grundlagen der Transplantation von Fremdem Knochengewebe, by Dr. Med. Wolfgang Lentz. George Thieme, Verlag, Stuttgart, Germany. Intercontinental Medical Book Corp., New York 16, N.Y.

The Coagulation of Blood, Methods of Study, edited by Leandro M. Tocantins, M.D., Grune & Stratton: New York, N.Y. 1955. Price $5.75.

Potassium Metabolism in Health and Disease, by Howard L. Holley, M.D. and Warner W. Carlson, Ph.D., Grune & Stratton, New York, N.Y., 1955. Price $4.50.

Peripheral Vascular Diseases, by Edgar V. Allen, M.D., Nelson W. Barker, and Edgar A. Hines, Jr. M.D. W. B. Saunders Co., Philadelphia, Pa. Price $13.00.

Clinical Diagnosis, by Elmer G. Wakefield, B.S.A., B.Sc., M.D., F.A.C.P., Appleton-Century-Crofts, Inc., New York, N.Y. Price $22.50.

Hospital Personnel Administration, by Norman D. Bailey. Physicians' Record Co., Chicago 5, Ill. Price $7.50.

Industrial Fermentations, edited by Leland A. Underkofler, Ph.D., D.Sc., and Richard J. Hickey, Ph.D., Vol. II. Chemical Publishing Co., Inc., New York, N.Y. Price $12.00.

Surgical Practice of the Lahey Clinic, by the Staff of the Lahey Clinic. W. B. Saunders Co., Philadelphia, Pa. Price $15.00.

Antimicrobial Therapy in Medical Practice, by Harrison F. Flippin, M.D. and George M. Eisenberg, D.Sc. F. A. Davis Co., Philadelphia, Pa. Price $5.00.

Aphasia Rehabilitation, by Martha L. Taylor, M.A. and Dr. Morton Marks. Institute of Physical Medicine and Rehabilitation, New York, N.Y. Price $3.00.

Signs and Symptoms, edited by Cyril M. MacBryde, M.D. J. B. Lippincott Co., Philadelphia, Pa. Price $10.00.

Local Anesthesia: Brachial Plexus (3rd ed.), by R. R. MacIntosh, M.D. and Wm. W. Mushin, M.A., M.B. The Williams & Wilkins Co., Baltimore, Md. Price $3.00.

Progress in Nursing, by Moncrieff. The Williams & Wilkins Co., Baltimore, Md. Price $4.50.

Synopsis of Medicine, 10th ed., by Tidy. The Williams & Wilkins Co., Baltimore, Md. Price $7.50.

Synopsis of Surgery, by Groves, 14th ed. The Williams & Wilkins Co. Baltimore, Md. Price $7.00.

Christopher's Minor Surgery, edited by Alton Ochsner, M.D. and Michael E. DeBakey, M.D., 7th ed., W. B. Saunders Co., Philadelphia, Pa. Price $9.00.

Studies in Medicine (in English) ; presented to Aleksander Rudolf Klossner on his sixtieth birthday. Edited by K. E. Kallio. 543 p. Helsinki, Finland, 1954.

Financing Hospital Care in the U.S., Vol. II—Prepayment and the Community, edited by Harry Becker, The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N.Y. Price $4.50.

Any of the above books may be ordered through the Association of Military Surgeons. Check book desired, and return this page.